THE FIFTY-SECOND YEAR.

Companion to the Almanac;

OR,

YEAR-BOOK

OF

GENERAL INFORMATION

FOR

1879.

PART I.

GENERAL INFORMATION ON SUBJECTS OF WAR INDUSTRIES, ACOUSTICS, PUBLIC LIBRARIES, THE PARIS EXHIBITION, ELECTRIC LIGHTING, METROPOLITAN WATER SUPPLY, AND PUBLIC ACCOUNTS.

PART II.

ARCHITECTURE AND PUBLIC WORKS, SCIENCE, PAINTING, MUSIC, PHILANTHROPY, LEGISLATION, STATISTICS, AND CHRONICLE OF 1877–78.

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COMPANION TO THE ALMANAC

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GENERAL INFORMATION ON SUBJECTS OF WAR INDUSTRIES, ACOUSTICS, PUBLIC LIBRARIES, THE PARIS EXHIBITION, ELECTRIC LIGHTING, METROPOLITAN WATER SUPPLY, AND PUBLIC ACCOUNTS.

THE WAR INDUSTRIES OF THE UNITED KINGDOM.

NATIONAL greatness is invariably attended with national responsibilities of the most onerous, and even burdensome, character, from which there rarely exist the means of escape. A nation desirous of maintaining its independence, and of resisting the violation of what it believes to be its just rights, finds itself compelled, in the present imperfect state of civilisation, to provide sufficient means both for the defence of its territory against hostile attack and for procuring redress for grievances at the hands of other powers. Great Britain, with its colonies and dependencies in every part of the world, its vast wealth, and its countless interests of every description, forms no exception to the rule. Its position as a first-class power is purchased at a price which probably no other nation could afford. At the present time it is annually spending more than 26,000,000*l.* in the maintenance of its army and navy, the actual amount being 26,075,629*l.* in 1877–8, and 26,649,701*l.* in 1878–9. This is exclusive of a supplementary vote of 6,000,000*l.* in the early part of 1878, when there existed every probability of a European war. Whether such an enormous expenditure is absolutely necessary is not for us to discuss. Our object is merely to indicate the manner in which a portion of these vast sums is used for industrial purposes, especially in connection with the numerous manufacturing establishments belonging to the nation; of the actual extent, character, and capabilities of which comparatively few people possess any adequate idea. There are several unimportant omissions, but these were unavoidable, considering the multiplicity of detail which would have been occasioned by including in the list of industrial occupations various employments of a strictly professional character.

Commencing with the national expenditure for naval purposes, we find that during the period ranging from the year 1865–6 to

the year 1877–8 the amount actually expended by the Government for shipbuilding purposes was 12,747,794*l.* Of this sum 8,414,814*l.* was devoted to ships built in the national dockyards, and the remaining 4,332,980*l.* to those built by contract. The total weight of the different vessels, wooden, iron, composite, and ironclad, thus constructed was 265,780 tons. The average number of artificers and labourers employed in the principal dockyards during the year 1877–8 was 16,109, but in the earlier part of 1878, when an interruption of the diplomatic relations between this country and Russia appeared imminent, it became suddenly increased to 17,565. Of these latter, 6,180 were required for building and completing new ships; 5,694 for repairing and refitting purposes; 2,529 for dockyard manufactures; 3,086 for dockyard and harbour service; and 121 for the Government stores at Deptford, Haulbowline, and Portland. The workmen formed two classes—those who were on the establishment, that is, permanently engaged; and those who were hired temporarily and became liable to dismissal when their services were no longer required. The number of the former during the year 1878–9 was 7,080, and the amount of wages received by them, 552,535*l.* The hired workmen, exclusive of the additional hands engaged at the commencement of 1878, numbered 9,031, the wages received by them amounting to 489,283*l.* Amongst these artificers were to be found shipwrights, caulkers, rope-makers, riggers, sail-makers, block-makers, joiners, painters, founders, boiler-makers, braziers, tinsmiths, coppersmiths, plumbers, coopers, pattern-makers, wheelwrights, sawyers, and representatives of numerous other trades, significantly indicating the marvellous extent and variety of the various industrial operations carried on in the dockyards. The number of vessels on which this mass of labour was directly or indirectly employed was 46, representing a weight of 13,568 tons to be built during the year. This was exclusive of repairing and refitting vessels already built, and numerous labours of an important character. The 46 vessels in progress included 11 ironclads, 11 corvettes, 2 dispatch vessels, 8 sloops, 9 gunboats, 2 sailing brigs, 2 torpedo mooring steamers, and 1 mooring lighter. The figures given do not represent the actual tonnage of the different ships when completed, but merely the quantity of work to be performed during the year. Thus the ironclad "Dreadnought," now building at Portsmouth, will weigh 7,350 tons, exclusive of her armament; her sister vessel, the "Inflexible," building at the same place, being only fifty tons less.

The number of ships under repair during the same period was 34, comprising 7 ironclads, 7 wood corvettes, 6 sloops, 9 gun-vessels, 2 gunboats, 1 gunnery ship, 1 training ship, and 1 store ship.

The work of shipbuilding is carried on principally at Chatham, Portsmouth, and Pembroke; and that of repairs at Portsmouth and Devonport. At Chatham, during 1878–9, 1858 men were employed in the construction of 4,391 tons of shipping; Portsmouth following with 1,650 men and 3,866 tons of shipping; succeeded by Pembroke with 1,228 men and 2,763 tons of shipping; Devonport with 866 men and 1,853 tons of shipping; and Sheerness with 358 men and 695 tons of shipping. The number of hands engaged in repairing and refitting vessels belonging to the Royal Navy were—Portsmouth 2,011, Devonport 1,796, Sheerness 704, Chatham 272, and Pembroke 72. Almost every kind of article required for shipbuilding or repairing purposes is produced in the workshops and other establishments attached to the various dockyards. These places, which are frequently of considerable extent, in several instances covering many acres of ground, are abundantly supplied with mechanical appliances of the most powerful and improved character, including some of the largest steam-hammers in this country, and comprise saw-pits, saw-mills, roperies, rigging-houses, sail and colour lofts, smitheries, capstan, mast and boat-houses, treenail and oar-makers' shops oakum and pitch-heating houses, metal and block mills, iron and brass foundries, lead-mills, boiler and engine smitheries, and coppersmiths', fitting, boiler, pattern, paint, joiners', turners', wheelwrights', millwrights', coopers', locksmiths', braziers', tinmen's, hose-makers', plumbers', galvanising, iron shipbuilding, tanning, and torpedo shops. The proper management of these numerous and diverse establishments naturally requires the possession of a considerable amount of administrative ability of the highest order, combined with strict integrity, conscientious impartiality, and not a little technical knowledge, qualities which are far more abundant in the public service than is generally believed to be the case. The very immensity of our dockyard system, the largest in the world, constitutes the real difficulty experienced in initiating immediate reforms in the details of management, however necessary may be the same, for the various processes dovetail into each other so closely that any sudden change in the working order of a single department would have a tendency to impede the efficiency of the others. Hence the reluctance evinced by successive administrations to interfere, at least to any considerable

extent, with the existing system. Whatever changes are made must be gradual and well-considered.

During the year 1875–6, the latest date at the time of writing (September, 1878) of the published official returns, the value of the materials used in the several dockyard manufacturing establishments was 791,114*l.*; the amount of wages paid to the workmen employed on the same being 95,019*l.* In the Sawpits and Sawmills the quantity of wood prepared for the use of artificers and others in the different workshops amounted to 188,041 cubic feet, of the estimated value of 31,586*l.* The kinds of wood used were English, Italian, and Dantzic oak; mahogany; teak; greenheart; cedar; English, Wych, and Canadian elm; Dantzic and Riga fir; pitch, yellow, and red pine; ash; beech; and old oak and fir. The varieties most largely used were the yellow pine, fir, English oak, mahogany, and English elm. In addition to the foregoing, 485,816 feet, running measure, of spruce and deck deal, valued at 4,844*l.*, were sawn ready for use. The pine and fir were mostly used for conversion into masts, yards, and booms, but the increasing substitution of iron for wood in the construction of war vessels has occasioned a lessened demand for the produce of the principal European and American timber forests. In the Mast-Houses the workmen are employed in the production, not only of every description of wooden masts and their accessories, but also of flagstaves, oars, sculls, and different kinds of boat gear. The value of the materials, including metal, leather, paint, nails, and other articles used in the mast-houses during the year above mentioned, was 3,337*l.* 3*s.* 10*d.*; the cost of the labour required for the same, 2,130*l.* 7*s.* 8*d.*; the general expenditure, 202*l.* 4*s.* 6*d.*; making a total of 5,669*l.* 18*s.* In the Boat-Houses oak, teak, mahogany, elm, and fir are the woods most in request for building or repairing barges, cutters, pinnaces, dingies, and other boats used for sea or harbour service. In 1875–6 the number of boats building or repairing, including those completed, was 275. Among the materials used were five cwt. of putty, paint to the value of 77*l.* 13*s.* 3*d.*, and 250 books of gold leaf; the actual amount expended on materials, labour, and miscellaneous requirements being 12,515*l.* 9*s.* 8*d.* The same items in the balance sheets of the Blockmakers', Treenail, and Coak-makers' shops amounted to 2,027*l.* 2*s.* 10*d.* Coaks are small cylinders of hard wood, let into the ends of pieces to be joined, to render the fastening more secure. They are made wholly at Devonport, where, during the year mentioned, no less

than 122,214 plugs made of fir, oak, and teak were produced. The Capstan Houses are devoted principally to the manufacture of capstan bars and anchor-stocks, for which fir and English oak are most in request. These establishments are situated at Chatham and Devonport, the annual cost of materials, labour, &c., being very limited, averaging about 650*l.* Oar-making is carried on at Portsmouth, Chatham, and Devonport, where machinery is largely used for this purpose, ash and fir being the woods chiefly employed. The number of oars made during 1875-6 was 23,913. Of these the greater number were required for sea service. The miscellaneous materials used included sheet-copper, leather, nails, paint, and gold leaf; the total cost of materials, labour, &c., being 9,605*l.* 9*s.* 7*d.* In the Oakum and Pitch-heating houses, spun oakum for caulking, mop-heads, composition for coating steam-boilers, cleansing powder, tarred paper, and other articles are produced, the quantity of spun oakum annually manufactured being upwards of 1,000 cwt. The cost of materials, labour, and general expenses in these establishments in 1875–6 was 3,525*l.* 9*s.* 10*d.* The amount of work performed in the Joiners', Turners', Wheelwrights,' and Coopers' shops during the same year is indicated by the value of the materials made up therein during that period. This was 7,381*l.* 19*s.*, the sum required for wages being 3,261*l.* 16*s.* In the joiners' shops every description of cabin furniture is made or repaired, also cushions, chests and boxes, coffins, meat safes, packing cases, and similar articles; treenails, rounds for ladders, and toggles being the leading products of the turnery shops. The ladder-rounds are made almost exclusively from greenheart wood.

The Smitheries are at Sheerness, Chatham, Portsmouth, Devonport, and Pembroke, those at the first-named dockyard being perhaps the most extensive. In these every description of iron-work, such as chain-cables, not requiring the use of steam-hammers, rolling mills, and other colossal machinery is produced. When the various artificers are at work the scene is one of a most startling character, the roaring of the numerous forges and ceaseless thud of heavy hammers creating a terrific and unbearable din. The weight of metal used in preparing new work in 1875–6 was over 1,909 cwt.; the value of the materials for all purposes, including repairs, in the same year being 27,189*l.* 16*s.* 9*d.*, and the amount paid as wages, 4,090*l.* 6*s.* 9*d.*; which, added to 981*l.* 7*s.* 9*d.* for general expenses, represents a total of 32,261*l.* 11*s.* 1*d.* The Steam-Hammer Shops at Chatham, Ports-

mouth, and Devonport appear to be principally used for working up old wrought iron, which is returned to the stores partly in the form of iron anchor stocks, and partly in the form of blooms, single worked, that is, masses of iron which have undergone the first heating and hammering. The quantity of metal passing under the steam-hammers during the year 1875–6 exceeded 6,574 cwt.; the value of the same being 728*l.* 15*s.* 3*d.*, and the cost of the labour employed 110*l.* 1*s.* 11*d.*; the general expenditure being 146*l.* 8*s.* 11*d.* In the Metal Mill at Chatham large quantities of old sheathing and other waste copper are annually refined, the quantity thus treated during the year above mentioned being 14,999 cwt. 1 qr. In the manufacturing department of the mill there were at the same time 183,796 cwt. 3 qrs. 21 lb. of copper, iron, and other metals prepared ready for use in the various factories and workshops, the whole representing a value of 156,961*l.* 15*s.* 3*d.*; the amount expended in wages being 5,334*l.*, and the general expenditure reaching 12,745*l.* 1*s.* 2*d.* The Lead Mill at the same place was occupied principally with the conversion of old lead into sheet and pipe lead, for which purpose a limited quantity of new pig lead was also used. Solder, together with leads for sounding and fishery requirements, were likewise manufactured here, the total weight of material used being 7,995 cwt. 1 qr. 14½ lbs., of the value of 8,831*l.* 16*s.* 3*d.*; the cost of labour being 203*l.* 13*s.* 9*d.*, and that of the general expenditure 363*l.* 15*s.* 4*d.* The cost of materials, labour, &c., in the Iron Foundry at Pembroke; the Galvanising Shops at Chatham, Sheerness, and Devonport; the Iron Ship-building Shops at Chatham; and the Coppersmiths' Shops at Portsmouth and Devonport, was 6,961*l.* 7*s.* The quantity of iron, principally in the form of boat-hooks, sail thimbles, and other articles, annually passing through the galvanising shops is very considerable. In the Millwrights' Shops at Chatham, Portsmouth, and Pembroke every description of lathe-work is practised, an immense number of bolts and screws, besides other articles, being produced each year. The chief business of the three establishments appears, however, to be the due repair of engine and pumping gear. Many of the lamps and lanthorns required for naval purposes are made or repaired in the Locksmiths', Braziers', and Tinmens' Shops at Sheerness, Portsmouth, and Devonport; but the principal use of the latter consists in the proper repair of every description of lock, tinware, and brassware. The cost of materials, wages, and general expenditure in these, and in the

Plumbers' and Painters' Shops, the character of which is fully explained by their names, was 12,903*l.* 16*s.* The increasing use of torpedoes in naval operations has necessitated the establishment of works at Portsmouth for the construction of dummy torpedoes, which are used principally for practice in placing and working. Their costly character is lilustrated by the fact that the materials used in the manufacture, repair, or alteration of 78 of these appliances cost no less than 1,026*l.* 14*s.* 9*d.*; the labour employed on the same amounting to 70*l.* 7*s.* 1*d.* The new works at Portsmouth do not in any way interfere with the manufacture of torpedoes at Woolwich, being intended merely to save delay in the repair and recharging of the torpedoes used for the protection of the approaches to Portsmouth Harbour.

The manufacture, alteration, and repair of leathern hose, and other articles of the same material, is carried on at Deptford, Chatham, Sheerness, Portsmouth, and Devonport, at a total cost of, for 1875–6, of 12,850*l.* 0*s.* 5*d.* The Tanning Shop at Chatham, however, has nothing to do with leather, the operations therein being confined to the tanning of seine and other nets. The nets are given out to be tanned, the principal materials used for this purpose being ground oak bark and catechu, the cost of which is inconsiderable in proportion to the value of the articles on which they are employed, being only 26*l.* 11*s.* 9*d.*, that of the latter being 792*l.* 19*s.* 10*d.* The amount expended in wages was 41*l.* 3*s.* 2*d.* The Rope-making establishments are situated at Chatham, Sheerness, and Devonport, where the greatest facilities for the systematic development of this important branch of industry exist, for although the progress of naval science has caused the use of ropes and cordage to become considerably decreased, if not wholly abandoned, in the equipment of ironclads and other armoured vessels propelled exclusively or in part by steam, the demand for them in connection with other purposes causes the quantity annually produced to remain extremely large. In 1875–6, the value of the materials used in the three great roperies was 193,518*l.* 5*s.* 3*d.*; the value of the labour employed in working the same, 10,384*l.* 17*s.* 5*d.*; and the general expenditure, including machinery, steam-power, &c., 10,462*l.* 0*s.* 7*d.*; forming a total of 214,365*l.* 3*s.* 3*d.* The weight of the raw materials exceeded 103,387 cwt. They comprised different kinds of hemp, aloe fibre, and oakum, together with comparatively small quantities of hides, for covering the ropes where exposed to friction, vegetable tar, limestone, thread jute, marking worsted, and

tallow. Nearly the whole of the hemp is obtained from Italy and the Baltic. This necessitates keeping considerable quantities of the raw material in stock. In the Rigging Houses, the work is of two descriptions, new and repaired. These include everything belonging to the rigging of ships, such as standing rigging, hempen cables, rope ladders, gun gear, slings, fire-buckets, sails, mats, sacks, hammock lashings, tackle and other hooks, and life-belts. The value of the raw materials used during the period before specified was 29,827*l*. 17*s*. 3*d*.; the cost of the labour employed, 4,247*l*. 4*s*. 1*d*.; and the amount of general expenditure, 671*l*. 9*s*. 4*d*.; being a total of 34,746*l*. 10*s*. 8*d*. In the Sail Lofts, as their name indicates, every kind of sail is made, from that intended for a ship's pinnace to those required for the majestic ironclad. The quantity of canvas used for sail-making in 1875–6, at Portsmouth, Chatham, Sheerness, Devonport, Pembroke, and Deptford, was 678,918 yards. Large quantities of cordage, iron and metal thimbles, roping and seaming twine, brass eyelets, hand lines, and other articles were also brought into requisition. Most of the work is done by hand, but there is every probability that before long the heavier portion of the labour will be performed with the assistance of machinery. The value of the materials made up in the sail lofts during the year above-mentioned was 48,144*l*. 14*s*. 10*d*.; the amount of wages paid to sailmakers and other workmen, 6,961*l*. 14*s*. 2*d*.; and the general expenditure, 2,187*l*. 3*s*. 3*d*., making a total of 57,293*l*. 12*s*. 3*d*. The Colour Lofts are devoted to the manufacture of naval ensigns, flags, union-jacks, pendants, and similar articles. The quantity of bunting and other materials for making these, also repairing nearly 1,500 flags of various descriptions, was 130,377 yards. The sewing machine is used to some extent in the colour lofts, thereby enabling a considerable portion of the work to be completed in a sounder, cheaper, and more speedy manner. In addition to flags, large quantities of Brussels carpet, damask for curtains, and other materials for fittings for ships' cabins, &c., are manufactured here in a very tasteful and artistic style. The value of the various materials used in 1875–6 was 5,435*l*. 12*s*. 2*d*.; the amount of wages paid for making up the same, 1,139*l*. 12*s*. 10*d*.; and the general expenditure, including purchase of sewing machines, 328*l*. 19*s*. 1*d*.; forming a total of 6,904*l*. 4*s*. 1*d*.

The engineering work of the dockyards is, as may be imagined from the wholesale manner in which steam has become substi-

tuted for sailing power, on a gigantic scale. It is performed at Chatham, Sheerness, Portsmouth, and Keyham, the latter place, which is wholly devoted to the manufacture of boilers and engine work generally, being the head-quarters of the industry, which is entirely of modern growth. There is a steam hammer shop at Keyham, but the quantity of the material hammered therein was only 858 cwt. 3 qrs. 24 lb. In the iron foundries at Chatham, Sheerness, Portsmouth, and Keyham, the value of the materials, used chiefly for metal castings, was 7,526*l.* 3*s.* 8*d.*; the wages paid amounting to 6,288*l.* 13*s.* 10*d.*; and the general expenditure to 2,150*l.* 12*s.* 2*d.* In the boiler smithies and shops, situated at the same dockyards as the preceding, the value of the materials was 47,088*l.* 16*s.* 8*d.*; the amount of wages, 15,798*l.* 14*s.* 5*d.*; and the cost of general expenditure, 1,808*l.* 7*s.* 1*d.* Among the marine boilers made during the year were twelve of 400 horse-power, four of 250 horse-power, eight of 160 horse-power, ten of 120 horse-power, and two of 114 horse-power. The cost of materials, wages, and general expenditure in the engine smithery at Keyham, brass foundries, coppersmiths' shops, fitting shops, the galvanising shop at Portsmouth, and the paint shop at Keyham, was 80,688*l.* 16*s.* 7*d.* The same items in the balance sheet of the pattern shops at Sheerness, Portsmouth, and Keyham, amount to 1,636*l.* 17*s.* 1*d.*

All this is exclusive of the contract work performed in private establishments. In the Navy Estimates for 1878–9, provision is made for the construction, by contract, of steam machinery to the extent of 20,171 indicated horse-power, for armoured and unarmoured vessels completing or building in public and private dockyards, at a cost of 43,609*l.* In the previous year, 489,233*l.* had been expended for the same purpose. The vessels completing or building in private yards in 1878–9 were the ironclad *Orion*, at Poplar; the steel and iron wood-sheathed corvettes, *Comus*, *Champion*, *Carysfort*, *Cleopatra*, *Curaçoa*, and *Conquest* at Glasgow; 2 gun-vessels, place of construction not stated; 24 torpedo-vessels and boats, at Chiswick; 1 first-class torpedo-boat (brass), East Greenwich; and 4 torpedo-boats, 4 high-floating stages, and 5 flat ditto, for Portsmouth dockyard, and 4 iron barges for the Cape of Good Hope. These represent 4,699 tons to be built during the period named, at a cost of 403,041*l.*, the amount similarly expended in the previous year being 302,517*l.* Torpedo-boat building is an entirely new industry, and at present confined to the works of Messrs. Thorneycroft, at Chiswick, long

famous for the production of small fast-going yachts. Similar vessels are being made at the same place for various European Governments. The number of artificers employed at Chiswick is about 450, most being professional boat-builders. The amount required in the same year for steamboats to be ordered, experimental purposes, repairs of ships at other than Government dockyards, salaries, pay, subsistence, &c., of officers, &c., superintending ships building by contract, and other works; hydraulic and steam machinery, and other fittings connected with turrets, torpedo machinery, torpedoes, and for breaking up ships, boilers, and machinery, was 209,450*l.*, against 252,250*l.* in 1877-8. Passing to stores required for naval purposes, we find their cost in 1878–9, to be—timber, masts, deals, &c., 100,100*l.*; metal and metal articles, including iron, armour plates, iron beams and masts, anchors, cables, capstans, pump and engine gear, &c., 473,000*l.*; coal and other fuel, 132,500*l.*; hemp, canvas, seamen's bags, coal-sacks, flags, bunting, worsted, &c., 137,400*l.*; paint materials, oil, pitch, tar, tallow, boats, furniture for ships, &c., glass, hides, leather, oars, and miscellaneous, 181,300*l.*; and purchases by officers of ships, foreign yards, coast guard, and freight, &c., of naval stores, 175,000*l.*, forming a total of 1,999,300*l.* This makes a sum of 2,221,300*l.* spent in a single year on works and materials supplied by private firms and companies.

The Government Victualling Yards are situate at Deptford, Gosport, Plymouth, and Haulbowline. In these a considerable portion of the provisions and nearly the whole of the clothing required for naval purposes are obtained from contractors. The difficulty frequently experienced in times of emergency of obtaining a sufficient supply of wholesome provisions, for both naval and military use, has tended to encourage the progress of manufacturing operations at Deptford, Gosport, and Plymouth, where the quantity of provisions annually prepared is believed to be considerably larger than in any other establishment, either public or private, of the same character. In 1875–6, the latest date of the published returns, 781,848 lbs. of wheat, value 3,876*l.* 10*s.* 10*d.*, were manufactured at these three places into 603,472 lbs. of kiln-dried flour, value 3,779*l.* 3*s.* 2*d.*; the middlings, pollard, bran, and other offal, weighing 145,133 lbs., being valued at 400*l.* 7*s.* 11*d.*, the remaining 33,241 lbs. being accounted for by loss in granary from shrinkage, in kiln-drying, and in grinding and dressing. The wages of the millers and other assistants amounted to 121*l.* 14*s.* 9*d.* In like manner, 731,866 lbs. of raw

flour; 100,183 lbs. of middlings, bran, &c.; 2,808,886 lbs. of biscuit meal; 370,664 lbs. of bran, pollard, and sweepings; 2,807,061 lbs. of biscuit; 4,275 lbs. of sweepings; 219,749 lbs. of oatmeal, and 94,736 lbs. of sides, husks, &c., of the aggregate value of 40,876*l.* 7*s.* 1*d.*, were manufactured during the same period, the amount expended on wages being 1,546*l.* 14*s.* 1*d.* At Deptford there are establishments for the manufacture, on a large scale, of chocolate (both ordinary and soluble), pepper, mustard-flour, mustard, and coffee; the latter, as well as a portion of the pepper, being made for army service. The quantities produced were—chocolate, 863,300 lbs.; cocoa-shell offal, 100,574 lbs.; soluble chocolate, 65,510 lbs.; cocoa-shell offal, 5,602 lbs.; pepper, 27,260 lbs.; ditto, for army service, 10,080 lbs.; mustard-flour, 45,771 lbs.; mustard, 45,793 lbs.; and coffee, 22,032 lbs. The value of these articles was 33,537*l.* 13*s.* 2*d.*, and the amount of wages expended in their production, 612*l.* 11*s.* 2*d.* During the same period there were salted, at Deptford, Gosport, and Plymouth, 45,052 lbs. of suet, of the value of 1,202*l.* 0*s.* 7*d.*, the amount required for wages being 8*l.* 9*s.* 8*d.* The quantity of beef salted at Deptford was 461,120 lbs., valued at 13,330*l.* 18*s.* 9*d.*, the wages paid the curers being 281*l.* 14*s.* At the same place were also produced 675 sennet hats, of the value of 90*l.* 17*s.* 9*d.*, the manufacture of which consumed 29,475 yards of sennet, the wages of the workers amounting to 72*l.* 19*s.* 2*d.* During the same period, 22,300 large biscuit bags, and 10,000 small ones, were made up at the Institution for Needlewomen, Hinde Street, Manchester Square, London, at a cost of 1,137*l.* 5*s.* 11*d.*, the value of the bagging and twine used being 833*l.* 8*s.* In addition to these, 12,010 shirts and 21,391 towels were made up, at a cost of 625*l.* 9*s.* 8*d.*, at various marine barracks, from materials supplied from the three great victualling yards, the value of the manufactured goods being estimated at 2,312*l.* 2*s.* 8*d.* Turning, again, to the work performed in the yards, we find it, including the manufacture of 9,830 hair beds, valued at 5,573*l.* 6*s.* 7*d.*, and costing, in the shape of wages, 218*l.* 4*s.* 10*d.* In the cooperages, in which the mechanical appliances are of a most efficient character, the number of casks, of various descriptions, made during the year was 35,248, besides 15,345 cooperage articles, the whole being of the value of 27,751*l.* 16*s.* 10*d.* The wages paid for making the same amounted to 3,696*l.* 16*s.* 9*d.*

In addition to the foregoing, provisions to the value of 349,512*l.* 17*s.* 9*d.*, candles and candle-boxes to the value of

33,240*l.* 1*s.* 8*d.*, mess-traps to the value of 11,090*l.* 10*s.* 11*d.*, victualling stores to the value of 34,420*l.* 5*s.* 4*d.*, and seamen's clothing, soap, and tobacco to the value of 93,667*l.* 14*s.* 8*d.* were received at Deptford, Gosport, Plymouth, and Haulbowline from contractors. The articles do not include those supplied by contractors to victualling yards and ships abroad, which reach a very large amount. The provisions included 3,661,854 lbs. fresh beef; 242,496 lbs. salt beef; 912,682 lbs. preserved provisions, including boiled beef and mutton, fowl, calves' feet jelly, essence of beef, potatoes, carrots, pickles, soup, and bouilli; 1,870,500 lbs. salt pork; 68,342 lbs. suet; 6,355,327 lbs. wheat; 344,839 lbs. oats; 826,560 lbs. split peas; 1,911,736 lbs. vegetables; 225,610 lbs. salt; 1,011,982 lbs. cocoa; 272,899 lbs. tea; 1,694,085 lbs. sugar; 209,012 lbs. treacle; 165,880 gallons rum; 7,748 gallons wine; 39,940 lbs. lemon juice, and proportionate quantities of brandy, porter, vinegar, chillies, malt, Indian meal, pepper, rice, raisins, and other articles; also supplies of coffee, tea, sugar, condensed milk, and pepper for army purposes; and ale, rum, coffee, cress and mustard-seed for Arctic service. Of candles there were 983,000 lbs., including 279,000 lbs. for "fighting lanthorns;" the candle-boxes numbering 20,068. The mess-traps included china, electro-plate, glass, and linen to the value of 9,080*l.* 3*s.* 2*d.* The clothing, &c., comprised 14,614 pairs half-boots, 22,248 pairs half-boots, 8,955 cloth caps, 19,200 comforters, 7,904 pairs stockings, 44,700 yards canvas, 15,162 yards of calico, 53,835 yards blue cloth, 60,000 yards drill cotton, 312,075 yards duck, 344,850 yards flannel, 537,545 yards blue serge, 94,545 hat ribbons, 23,655 knives, 1,145,005 lbs. soap, 386,407 lbs. tobacco, besides large quantities of combs, black silk handkerchiefs, scissors, tape, thread, and other articles. The manufacture of the foregoing is spread over the whole of the United Kingdom, a considerable portion of the preserved provisions coming from the north of Scotland, the woollens from Yorkshire, the cotton goods from Lancashire, the boots and shoes from the midland counties, and the knives and scissors from Birmingham and Sheffield. Indeed, there is scarcely an industrial centre in which goods of some kind or other are not made for naval or military use.

The bulk of articles required for army purposes; likewise guns, projectiles, gunpowder, and gun-cotton for the navy, are manufactured at Woolwich, Enfield, Birmingham, Waltham Abbey, and Pimlico, where the Government possess establishments fitted up in the most complete manner possible. The

first of these, the Royal Carriage Department, at Woolwich, furnishes every description of carriage, slide, and platform for naval and military guns of the largest calibre; also sponges, rammers, handspikes, military waggons, ammunition carts, hand-barrows, dismounting tackle, wooden levers, boat pontoons, stretchers for ambulance waggons, tampeons (wooden cylinders for stopping the mouths of guns), trucks, and numerous articles required for transport service, engineer, field, garrison, and siege equipment, woodwork for saddle-trees, &c.; the total cost of materials during 1876–7 being 72,826*l.* 4*s.*, and the amount expended in wages 70,531*l.* 18*s.* 5*d.* This does not include the immense quantity of work effected in the shape of repairs and alterations, the cost of which so far as regards materials and wages amounted to 11,992*l.* 16*s.* 1¼*d.* In the Royal Gun Factory upwards of 542 pieces of ordnance, ranging from the 800-pounder of 38 tons weight to the 7-pounder of 150 lbs., were produced during the past year. In the four years previous, that is, from 1872–3 to 1875–6, no less than 2,422 heavy guns were manufactured. Among these was the famous 80-ton gun, completed in 1875–6, which, with a charge of 425 lbs. of powder possesses a striking force of 30,168 foot-tons. The ordnance produced in 1876–7 included 44 38-ton guns, 5 25-ton guns, 14 18-ton guns, 217 64-pounders, and 40 40-pounders. The materials for these guns cost 172,664*l.* 17*s.* 7¼*d.*, the wages amounting to 58,917*l.* 5*s.* 1½*d.*, and the indirect expenditure to 26,127*l.* 3*s.* 9*d.* The 38-ton gun is said to have completely superseded the 35-ton gun, which only a few years ago was regarded as a wonderful specimen of destructive power, and was popularly known as the "Woolwich Infant." In addition to the work above-mentioned during 1876–7, no less than 522 guns and howitzers of different calibres were sighted and completed after proof, and a considerable number of appliances manufactured, at a cost of 12,470*l.* 14*s.* 9*d.* for materials, wages, and indirect expenditure; a further amount of 23,722*l.* 17*s.* 5¼*d.* being expended in the same manner for miscellaneous services, including the inspection, repairing, altering, and sighting of guns in various parts of the United Kingdom. The performance of the enormous amount of labour required in the Woolwich gun factories is considerably facilitated by the powerful steam-hammers and other mechanical appliances, which have made this department of Government manufacturing industry unrivalled in extent, completeness, and efficiency. During 1876–7, in addition to the work already mentioned, 11,700 tons of blooms and gun iron were

produced at a cost of 89,591*l.* 8*s.* 8½*d.* for materials, wages, and general expenditure.

Numerous pieces of ordnance are also supplied by private contract from the establishments of Sir William Armstrong and Co., better known as the Elswick Ordnance Company, at Elswick, Newcastle-on-Tyne; Sir Joseph Whitworth and Co., near Manchester; and of Messrs. Vavasseur and Co., London. At the Newcastle works was produced the great 100-ton gun, the success of which showed that the limit of weight and power in the construction of these murderous implements of warfare was far from being reached. It occupied two years in manufacture, but with the plant and facilities possessed by the company, a similar gun could be turned out once a month. The number of artizans and labourers employed at the Elswick works is about 4,000, and it is stated that of guns from 15 tons to 18 tons weight, capable of piercing the sides of most of the ironclads afloat, something like fifty tons per week could be produced. If field guns were required, from eight to ten batteries could be manufactured per month. The guns are turned out complete to any required pattern, with all their carriages and equipment of ammunition. The work of the establishment, which owes its origin to the mechanical genius of Sir William Armstrong, includes the production of numerous carriages, made on the hydraulic principle, for many of heavy guns forming the armament of our large ironclads or used for purposes of colonial defence. The establishment of Sir Joseph Whitworth and Co. employs about 800 hands, and is limited to the manufacture of artillery on the principle with which is associated the name of the head of the firm, but which have not as yet, we believe, been adopted by the Government, although four 35-ton Whitworth guns were made for the Brazilian ironclad *Independencia*. The works of the London Ordnance Company, or rather Messrs. Vavasseur and Co., were founded by Captain Blakesly, and employ over 300 hands, most of the work, which does not include the production of heavy guns, being executed for foreign powers. Should an emergency arise, the whole of the resources possessed by these three private establishments would become placed at the disposal of the Government.

The Royal Laboratory at Woolwich is occupied chiefly with the manufacture of projectiles, ammunition, and appliance in which chemical products form a feature. It is here that the larger quantity of cartridges required for naval and military purposes is made. Of these there were produced in 1876–7, for small

arms, 65,773,930; and for heavy guns and other ordnance, 211,064. There were also manufactured during the same period, 87,282 fuzes, 10,637 rockets, 231,578 shells, 222,139 heavy shot, and vast quantities of cylinders, paper-cartridge covers, silk-cloth cartridges, bags for bursting charges, and similar articles. Many of the processes, such as filling cannon cartridges, shells, and small cartridges; making Whitehead and other torpedoes; filling torpedoes with gun-cotton; and packing gunpowder; are of a highly dangerous character, and every possible precaution has to be adopted for the purpose of avoiding accident. Nevertheless, serious catastrophes involving considerable loss of life and property do occur, principally from some slight neglect on the part of the workers, or from unavoidable causes, such as the workshops being struck by lightning. The miscellaneous work performed in the Royal Laboratory is of a most multifarious description, including the manufacture of range-finders, girders for roofing, iron tramway plates, pontoons, fire-engine requisites, gymnastic apparatus, models and targets, rifle rests, medical operating tables, tin boxes for holding life-saving apparatus, buckets, cartridge and shot gauges, ladders, lanyards, wooden pegs, plugs, both metal and wooden, port-fires, rocket-sticks, tubes, tubs, and wads. In short, the department comprises many industries which would appear to belong more properly to others, but which have been introduced with the view, not only of enabling every process directly or indirectly connected with the manufacture of projectiles and appliances in which explosive compounds are used, to be under one superintending authority, a matter of the greatest moment, but also to secure greater economy of time and labour, besides facilitating the enforcement of precautions against accident. The amount paid in the form of wages during the year was 176,053*l.* 9*s.* 3*d.*, the materials consumed being of the value of 210,280*l.* 11*s.*

The Royal Gas Factory at Woolwich calls for no remark, beyond mentioning that it produced 78,223,500 cubic feet of gas during 1876–7, for the use of the various Government establishments, the wages of the labourers employed amounting to 2,896*l.* 0*s.* 6*d.*; the cost of materials being 7,615*l.* 15*s.* 2*d.* Of the work performed in the Saddlery Department, few details are given, but it would appear that the work performed in the course of the year included the manufacture of 3,322 saddle trees, and 1,596 complete saddles. The number of workmen is not stated, but at least one-half belong to the cavalry portion of

the army, and receive wages in addition to their regimental pay, the object being to familiarize them with the details of saddlery work, so that in the event of their regiments being required for active service, they may assist in keeping the saddles in a proper state of repair. Unless some such precaution were adopted, a considerable portion of our mounted soldiery would be found useless at the very moment their assistance was most required. The materials used during the year in this department cost 4,718*l.* 13*s.* 11½*d.*; the wages of the workmen amounting to 3,900*l.* 18*s.* 2¼*d.* Of this latter sum, 1,859*l.* 1*s.* 1¾*d.* (including both regimental and departmental pay) was received by the military hands. The bulk of the saddlery required for Government purposes is supplied by contract, the principal seat of manufacture being Walsall, in Staffordshire. In 1877–8 the amount thus expended was 35,000*l.*; in 1878–9, it became increased to 57,000*l.*

A considerable portion of the work performed in the Royal Small Arms Factory at Enfield consists in the conversion and alteration of rifles and other small arms. Thus, in 1876–7, no less than 131,351 Martini-Henry rifles were thus altered, the object being to render the weapon as efficient as possible. The arms manufactured comprised 31,901 Martini-Henry rifles, with cleaning rods, 16,107 ditto, without cleaning rods, 61,436 triangular bayonets, and 963 sword bayonets, besides many thousands of triggers, strikers, jags, snap-caps, protectors, scabbard springs and rivets, and other articles required in the production of rifles and bayonets; the value of the metals used therein being being 20,686*l.* 5*s.* 7*d.*; and the wages of the workmen amounting to 91,822*l.* 7*s.* At the Birmingham establishment, the labours of the department are confined principally to the examination, testing, and repairing of small arms of every description. All the articles used in the manufacture of small arms for the Indian Government are viewed and packed here. In 1876–7, these included 40,471 snap-caps, 1,000 scabbard bands and rings, 400 revolver pistols, 400 holsters for ditto, and 40 staff sergeants' swords. The work for the Home Government included the repair of 2,026 carbines, 1,070 swords, 8,334 bayonets, 10,515 gun-barrels, and 83,295 rifles of various descriptions. There were also "viewed" no less than 85,344 arms for volunteer and militia use, 18,757 bayonet scabbards, and 20,825 snap-caps. The wages paid in this department amounted to 12,253*l.* 16*s.* 9*d.* The gun-barrels

and gun-stocks, which were formerly manufactured in large quantities in London, especially in the vicinity of Tower Hill, appear to be supplied largely by contract, the amount expended in the purchase of small arms, including these articles, from private makers, being in 1877–8, 36,500*l.*, and in 1878–9, 21,360*l.*

At the Royal Gunpowder Factory, Waltham Abbey, there were manufactured in 1876–7, 15,509 barrels, each containing 100 lbs., or 1,550,910 lbs. in all, of gunpowder, and 2,858 lbs. of gun-cotton, the principal portion of the latter being required for charging torpedoes; the wages of the workmen employed amounting to 14,001*l.* 9*s.* 10½*d.* As at the Royal Laboratory at Woolwich, every precaution is taken against the risk of explosion and to decrease the possible amount of damage, the result being to render the works the safest of their class, most of the accidents which have recently occurred being traceable to the negligence of the employed, which frequently neutralizes every attempt on the part of the authorities to make the various processes all but perfectly devoid of danger. A large proportion of the gunpowder is re-worked from old materials, various sized grains being made according to the mode in which it is intended to be used. The gunpowder, when manufactured, is stored chiefly in floating magazines at Woolwich, Erith, and other places. In 1877–8, gunpowder and gun-cotton to the value of 8,250*l.* was purchased by contract. In the following year, submarine mining stores to the value of 15,300*l.* were obtained in like manner.

The Royal Army Clothing Factory at Pimlico was established for the purpose of enabling the Government not merely to effect a saving in the cost of the clothing required for the use of our troops at home and abroad, but also to secure the best material and workmanship in the production of the same. This step, on the part of the Government, was naturally regarded with much jealousy by the various houses engaged in the supply of army clothing, and it was confidently predicted that the experiment would prove a costly failure. Experience has, however, shown it to be otherwise. Formerly, when the manufacture of military clothing was confined to private firms, large quantities were made up in the poorer metropolitan neighbourhoods at rates considerably too low to be compatible with sound finish, in consequence of the contractors, sub-contractors, and others, through whose hands each article passed on its way to and from the workers, absorbing, as their share of the profit, a considerable

percentage of the price paid by Government. So small, indeed, was the pittance frequently received by many of the operatives, both male and female, that they possessed every inducement to "scamp" their work, and, whenever practicable, quit their miserable occupation for others of a less laborious and more remunerative character. The materials were, almost without exception, made up at the homes of the workers, a system which, in the case of articles of clothing, possesses various objections. The invention of the sewing machine rendered possible the introduction of the factory system, with its minute division of labour and corresponding gain in the cost of production, to say nothing of the improvement in the physical and social condition of the workers. This has caused the navy clothing, now supplied by contract, to be much better and cheaper than that so obtained before hand-labour had become superseded by that of the machine. Whether, under such circumstances, the possession of the Pimlico establishment is a national advantage or otherwise remains to be seen, but there can be no question that, as at present conducted, the various processes are completed in the most efficient and economical manner, securing to the community every possible advantage obtainable from the system. Among the goods made therein during 1875–6 were 80,763 tunics, 146,944 frock-coats, 29,317 jackets, 1,619 cavalry jackets, 1,854 waistcoats, 12,108 pairs of pantaloons, 259,388 pairs of trousers, 20,475 great coats, 18,884 capes for the same, 20,579 chacos, and 28,486 forage caps. There were also 5,804 cork helmets made in the same year. In addition to the foregoing several thousand articles of clothing were cleaned, altered, or repaired. Some of the goods were purchased in a semi-manufactured state, being finished at the factory. The wages of the workpeople amounted to 71,160*l.* 7*s.* 2¾*d.*; and the value of the materials made up to 311,691*l.* 15*s.* 1*d.* The accoutrements were supplied almost exclusively by contract, the value of the same in 1877–8 being 30,000*l.*; and in 1878–9 17,000*l.*

From the foregoing details it will be perceived that there are few branches of manufacturing industry which do not absorb a portion of the annual expenditure necessitated by the maintenance of our naval and military system, thereby furnishing remunerative employment for a vast amount of private capital, and providing directly or indirectly the means of livelihood to many thousands of workpeople of both sexes in the great industrial centres throughout the United Kingdom.

JOHN PLUMMER.

TELEPHONE, MICROPHONE, AND PHONOGRAPH.

WITHIN a recent period three or four instruments of extraordinary character have been brought under public notice, all depending on acoustics or the science of sound, and all giving some new insight into the principles of that science. These new inventions have not only set physicists to work, to examine little-known phenomena of sonorous vibrations; they have also opened a path, indeed a series of paths, to practically useful applications in everyday life.

The Telephone.—To talk at a distance, to render sounds uttered at a distance clearly audible, has long been a favourite project among scientific mechanicians. Deal rods, it is known, convey sonorous vibrations readily along the direction of the fibres; iron and leaden pipes are excellent conveyers of sound; india-rubber and gutta-percha tubes act still better; while an insulated electric wire is now found to be the best of all conductors. The *bell-telegraph*, invented many years ago, is virtually a telephone; it is a distant sounder: seeing that by its means an operator at Birmingham, Manchester, Edinburgh, or elsewhere can ring a bell in London. The unsolved problem has been, until recently, how to convey musical sounds, and especially the articulated sounds of the human voice, to great distances—distances measured by tens or hundreds of miles.

Many inventive brains had been at work long before Professor Graham Bell took up the subject, devising modes of conveying sounds to great distances. As they paved the way which has led to the recent remarkable success, a few words of description concerning these contrivances are desirable.

Professor Page discovered that the rapid magnetisation and demagnetisation of an iron bar produces a musical sound; there is a barely audible click at each change of magnetic condition; and a rapid succession of these clicks was made to produce what he called *galvanic music.* Mr. Edison, the inventor (some years afterwards) of the celebrated *phonograph* which will come for description in a later page, invented an instrument called by him the *electromotograph;* this was a sort of chemical telegraph combined with a telephonic or distant-sounding apparatus. M. La Cour has devised an instrument whereby, with the aid of tuning forks, finger keys, telegraphic wire, and other appliances, he was able to transmit audible sounds from Fredericia to Copenhagen

in Denmark. Professor de la Rive has employed electric wires in connection with electromagnetic apparatus for conveying sounds to a distance. Mr. Varley has brought into requisition a number of tuning forks of different tones, finger keys to set them vibrating, and electric wire to connect the whole, so arranged as to transmit sounds to a limited distance; he has also employed reeds and strings instead of tuning forks. Mr. Gower has exhibited at one of the Royal Society's soirées two instruments called by him the *telephonic piano* and *telephonic harmonium*, in which an electric conductor is combined with some of the principal apparatus of the ordinary pianoforte and harmonium respectively. Professor Reiss, of Friedrichsdorff, invented an instrument comprising a stretched membrane, an electric wire, and a magneto-electric apparatus; it sent a series of barely audible clicks, all of one tone or pitch, through a great length of wire. His experiments were made with apparatus remarkable for its rough simplicity—the bung of a beer-barrel, the skin of a German sausage stretched over a cavity made in the bung, a bit of platinum, a drop of sealing-wax, a knitting needle, and the body of a violin as a resonator or sounding-board. Although he could not transmit vocal sounds, and only one note of musical sounds, there was, nevertheless, much in Reiss's invention that suggested ideas to later investigators.

Mr. Elisha P. Gray, of Chicago, has introduced many inventions bearing on the subject of telephony. He has employed tuning forks, like many other investigators, but with ingenious adaptations and novelties. Mr. Gray, it is understood, has had in view improvements in ordinary telegraphy, rather than the transmission of musical sounds as a matter of amusement; but it is certain that he has sent such sounds through wonderfully great distances. In February, 1877, he transmitted such sounds from Chicago to Milwaukie, 85 miles off; and in the next following month from Chicago to Detroit, 284 miles. But these were musical tones only; it formed no part of his purpose to transmit the sounds of the human voice. Page, La Cour, De la Rive, Varley, Gower, Reiss, Gray—none of them achieved telephonic speech.

We now come to the consideration of the invention which, on account of its remarkable success, is generally recognised as the telephone *par excellence*.

Mr. Alexander Melville Bell, originator of the system of orthography known as "Visible Speech," went to America, and,

with his son Mr. Graham Bell, engaged in devising apparatus for teaching deaf mutes. After a time the son set himself a problem in answer to the question—"If I can make a deaf-mute talk, can I not make a piece of iron talk?" He began his researches in 1872, but three or four years elapsed before he could send a short musical message through two miles of wire. He took out a patent, and made his first exhibition in 1876. He talked through his telephone from Cambridge to Boston, Massachusetts; a lady sang through it "The Last Rose of Summer;" both were heard at the other end; as were likewise the violin, violoncello, laughter, and applause. From the first the transmission of audible articulate speech was regarded by him as more important than that of musical sounds; but he managed to combine both objects in a most remarkable way.

In January, 1877, Mr. Graham Bell was able to announce that he could transmit the tones and inflexions of several voices at once. A lady sang "The Last Rose of Summer," every note and word of which were heard at Salem, the lady being at Boston, 18 miles distant—"the sounds having about the same effect as if the listeners were at the rear of a concert hall, say a hundred feet behind the singer." On one occasion, in the following month of February, Mr. Watson being stationed in a room at Boston, and Mr. Bell at Salem, the former transmitted to the latter a sound from a telephone, something like that from a horn; Mr. Bell sent organ-sounds back to Boston; Salem then asked Boston for a song, which was speedily responded to in "Auld Lang Syne;" Salem asked Boston to make a speech; to which Boston replied, "Ladies and Gentlemen, it gives me great pleasure to be able to address you this evening, although I am in Boston and you in Salem"—a neat little speech which was heard all over the hall at Salem. By the month of March in the same year, Mr. Bell succeeded in transmitting sounds from Boston to North Conway, a distance of 143 miles; and a few telephonic messages were sent from the one town to the other. In May, with Mr. Bell at Boston and Mr. Watson at Somerville, five miles distant, the former said, "Mr. Watson, are you ready?" This was followed by an answer, "Yes," and the singing of a song and a hymn. In the same room at Boston, Mr. Bell had another telephone, placed in connection with the town of Providence, 43 miles away; he transmitted the sentence "Signor Brignoli, who is now assisting in a concert at the Providence Music Hall, will next sing for us;" and presently the Italian singer's tenor

voice was heard, somewhat irregular in audibility, but still distinctly. The remarkable performance closed with a cornet solo, played at Somerville, and well heard at Boston. About the same time, at Yale College, an experiment on telephony was combined in a striking way with one on electric currents. Sixteen persons assembled in a room at the college, which was placed in connection with a telephone by an electric wire passing through several intermediate apartments; the sixteen persons were in two rows of eight each; the first in each row held one end of the wire, while the last in each touched a wire attached to the magnet of a second instrument; a telephonic sound passed through the bodies of all the sixteen persons without being perceived by them, and yet was audible in a second telephone in the very same room!

Mr. Bell has made so many improvements in his telephone from time to time, that a detailed description would overpass the limits of this article. The early form, with which many of his experiments in America were conducted, comprised an electric coil, in the centre of which was a soft iron rod. The rod at one end projected beyond the coil towards a diaphragm, leaving a small space between them; the diaphragm, made of goldbeater's skin, was stretched over and fastened to a movable brass ring. In the centre of the diaphragm, and on the surface farthest removed from the coil, was a small bit of clock-spring. A mouthpiece, somewhat bell-shaped, terminated the instrument at the end farthest from the coil; while, at the other end, were connecting wires and a galvanic battery. The free end of the coil had a projecting rod, which enabled it to rest in a cavity in an upright support, and rotate thereon.

When his researches were further advanced, Mr. Bell dispensed with the galvanic battery, and substituted a permanent magnet; he also saw an advantage in employing a thin metallic diaphragm or vibrator, instead of stretched membrane. With these changes, he produced a telephone comprising a powerful compound magnet, to the poles of which were attached ordinary telegraphic coils of insulated wire. In front of the poles of the magnet was a diaphragm of very thin sheet iron; and in front of this again a mouthpiece, through which the voice of the speaker or singer passed to the diaphragm. The vibrations of the latter, under the influence of the breath of the voice, or the agitated air around a musical instrument, produced a current of electricity in the coils; undulations were propagated

along the wire, synchronous with the vibrations of the diaphragm. Arrived at the other end of the wire, these undulations passed through the coil of a second apparatus similar to the former, and were reconverted into audible sounds by another vibrating diaphragm and another mouthpiece.

Bell's telephone, as now usually made for short distances, is about six inches long, three inches in diameter at the larger end, and about half as much at most other parts; the diaphragm, made of ferrotype sheet iron or of tinned plate, presents an area of somewhat under two inches in diameter to be subjected to vibration; the coil is an inch in diameter by a quarter of an inch thick; while a space of about a twentieth of an inch is maintained between it and the diaphragm, susceptible of being made greater or smaller by adjusting screws.

The long-distance telephone has a few modifications, one of which is an arrangement for fixing it against the wall of a room, for office or counting-house use; but in principle it is nearly the same as the instrument just described.

There cannot be a better test of the merits of Mr. Bell's telephone than the account given of it by Sir William Thompson, one of the scientific jurors at the Philadelphia International Exhibition in 1877; when such a man, among the very foremost of living authorities on electrical apparatus and appliances, declares that his astonishment and admiration were almost unbounded, it is high praise indeed. We may remark that, in the best mode of practical application now in use, for conversation between two persons, two telephones are held by each, one to the mouth and the other to the ear. Generally speaking, the voice has a weird, curious sound when heard through the telephone, somewhat ventriloquial in character; if the instrument be held an inch or so from the ear, the effect is as if some one were speaking far off in the building, or as if the sound were coming up from a vaulted cellar or through a massive stone wall. It is easy to produce a kind of screech or prolonged shout, as an alarum, if music, singing, or speech is not intended to be conveyed. Three or four telephones may be "switched" on to the same circuit of electric wire, and all made to speak, sing, or play in unison. A curious fact has been ascertained: that if the mouthpiece be divided into two or more sections, provided with an equal number of diaphragms, the instrument will produce two or more fold the usual sonorous effect. No scientific or practical man can at present foretell what forms this wonderful instrument will even-

tually assume; for telephonic effects have in some experiments been produced without any diaphragm at all, or even any mouthpiece.

Fanciful conjectures have been put forth concerning the possible application of the telephone. "The partner in London may perhaps be able in the future to consult the representative of his house in China or Japan upon any matter of business with the same ease as if they were both seated in an office in Lombard Street or Mincing Lane." . . . . "To the overworked Parliamentary reporter the telephone comes like a messenger from fairyland. No more tedious hours with his pencil, paper, and shorthand notes. All he requires is a simple instrument a few inches long, and the very tones and inflexions of the voice of the honourable member who is delighting the House with his eloquence can be transmitted as they are being uttered to the office of the newspaper, where the type will be half set up before his words have died away." . . . . "The many watchers on our great lines of railway need no longer gaze with anxious eyes upon the tell-tale needle which gives the notice of passing and repassing trains; without any trouble, and in clear articulate sounds, the voice comes floating into his cabin which tells him that the express is on its way." . . . . "And even more than this; as the acoustic properties are improved, no doubt the strains of beautiful music that are filling room or hall will be conveyed to twenty different places, to be reproduced to twenty different audiences miles away." . . . . "Nor need we despair of seeing Herr Wagner, from his throne at Bayreuth, dispensing the 'Music of the Future' in one monster concert, to St. Petersburgh, Vienna, London, and New York—in short, to all the musical world at once."

Nor has sarcastic humour failed to find a field for its exercise. "If, for the sum of a few pounds, communication could be formed from a main wire to private houses, we may expect an enormous extension of telephony. One of the first steps which a young couple upon their engagement would take, would be to have the speaking wires laid down to their separate rooms, and thus at any time be able, free from the curious eye of the world, to indulge in sweet commune. The extension of the system might not prove so pleasant in other cases. Thus, for example, the University authorities might take it into their heads to attach an instrument to every room in the colleges, in order that the young men might report that they were steadily at work every

quarter of an hour during the evening to anxious parents at home."

But all fanciful and whimsical speculations apart, there is solid ground for estimating the probable applications of this remarkable apparatus to useful purposes. Merchants and managers of commercial and manufacturing establishments already give orders through the telephone to their clerks and workmen. Fire engines are summoned in America by similar means. City men have in many cases established telephonic communication with their private residences. The Water Board of Cambridge, Massachusetts, are placed in connection by telephone with their water works. Many firms have found it advantageous to substitute the telephone for Wheatstone's A B C telegraph in private telegraphy. The *Daily News*, early in 1878, laid down a wire from the office at Bouverie Street to the House of Commons, and a portion of a debate was transmitted. This must be a difficult matter to organize into a system; but though difficult, it may, perhaps, be overcome by clever brains. The telephone has been made useful in submarine or subfluvial operations in the following way:—Inside a diver's helmet was placed a telephone into which he could speak; the flexible breathing-tube was kept in form by an inner coil, which was also made available as an electric wire; he conversed readily with another person, the one being under water the other in the open air. Sir William Thompson superintended a remarkable experiment at a colliery near Wigan in November, 1877. An ordinary telegraphic wire was hung from top to bottom of one of the shafts; questions asked at the top, through a telephone, were promptly answered through another at the bottom; the colliers cheered when they heard the questions, and the cheering was detected by the telephone at the top; those below also heard the buzz of animated conversation at the top. The main object in view was to show whether the state of the air in the pit could reveal itself through the telephone to the managers and foremen above—a most important matter, which is still undergoing investigation. Sir William wound up the proceedings by doing that which assuredly had never been done before; he delivered a brief lecture on the wonders and utility of the telephone to two audiences at once, one at the bottom and the other at the top of the pit! Dr. C. Le Neve Foster and his brother, Mr. A. Le Neve Foster, about the same time made another successful application of telephony to mining, at the Eliza Mine, St. Austell, Cornwall.

The musical capabilities of the telephone are extraordinary; not so important as those which apply to the acts and wants of everyday life, but pregnant with a future which we cannot even foreshadow. In the autumn of 1877, at Montreal, two persons sang into two telephones in one room; a third, standing on the sounding board of a pianoforte, sang into another telephone; in another house, connected by electric wire, a fourth telephonist heard the united sounds as if they formed a vocal trio with pianoforte accompaniment! On another occasion, five telephones were attached to one end of a line of wire ten miles long, and a single telephone to the other end; five listeners at the five instruments simultaneously heard singing at the sixth, followed by speeches and music; and questions put by any of the five were answered by the one. At Hamilton, in Canada, in the same year, nine telephones were placed in the same circuit, of which the electric wire passed through three houses; songs and speeches from any of the nine were heard by all the others; "Auld Lang Syne" was sung at one house while the "Old Hundredth Psalm" was being sung at a second, and both were heard simultaneously at the third.

Military men are studying the problem of applying this instrument to the strategy and tactics of war. The autumn manœuvres, both in France and Germany, of 1878, have been marked by the use of the telephone for outpost work. The torpedo, now regarded as so potent an agent in naval warfare, is being tried in conjunction with a telephone as a torpedo tester: the instrument reporting the available condition, to persons on shore, of torpedoes laid down in a port or estuary.

If used for ordinary telegraphic purposes, to convey messages between distant stations, the telephone may (in the opinion of some practical men) possibly be tampered with for nefarious purposes by "tapping" or "milking" the wire, and drawing off the message. A military commander might, it is surmised, apply this kind of cunning; an expert sound-reader, accompanying a column sent to cut off the enemy's telegraphic connections, might precede the act of destruction by robbing him of some of his secrets. If this be so, then practical telegraphists and telephonists must devise the means of frustrating the schemers—a duty that does not seem to be beyond the reach of skill and ingenuity.

The Microphone.—This is a direct offshoot from the telephone, and is the most delicate instrument ever yet invented for detecting

sounds. Professor D. E. Hughes, inventor of the beautiful type-printing electric telegraph, while experimenting one day on the effect of sonorous vibrations upon the electric behaviour of conductors, observed that a stretched bit of wire, which formed part of the circuit, when it broke, gave forth a sound something like *sh*. Speculating on the cause of this, he placed the broken ends together under a weight, and obtained faint sounds; he placed connecting bits of iron, nails, and steel watch-chain, and had better sounds; still better from metal-powders and metal filings; and so he arrived by degrees at the theory which underlies the microphone. He found that if contact in an electric wire be suddenly broken and as suddenly renewed, a tick or snap is heard each time; but that if the breaking and re-making are gradual, the tick is preceded by a preliminary murmur or grating. Every kind of dragging or stretching, squeezing or compressing, before actual rupture, tends to produce this murmur.

The problem which thence arose, and which Professor Hughes pursued to a definite practical result, was, what substances to employ and what arrangements to adopt, in order to produce this audible murmur whenever a change occurred in stretching or compression. In every case the substance employed must form part of an electric circuit, and every sonorous change it undergoes sends an intermittent current along the wire. If the particles of the substance are near together, but mobile, they may approach or recede, lengthen or shorten, become more resistant or less resistant. Every molecular change of this kind, however minute, affects the current, and thus enables the electric wire to convey the news that the substance is murmuring because disturbed.

To obtain a substance of which the particles are near together, but mobile, Professor Hughes tried iron-filings, charcoal interpenetrated with mercury, white metal powder, and small sticks of gas-carbon. The actual sound, inaudible to man, may be produced by the merest contact of any substance with a thin slab of wood; but the augmentation of the sound to audibility is brought about through the intervention of the substance having mobile particles. The Professor filled a glass tube, three inches long, with a white powder of tin and zinc, and closed the two ends with plugs of carbon which slightly compressed the powder, the outer ends of the carbons being made parts of an electric circuit. When the two ends of the glass tube were slightly pulled, as if to pull them asunder, the tube lengthened to an infinitesimal degree

and gave more room to the powder inside. Small as it was, this motion affected the needle of a galvanometer. When, on the contrary, the two ends of the tube were pressed together, the needle took a set in the reverse direction. When the tube was set upon a small box as a resonator, audible sounds were heard on stretching or compressing the tube. It was next found that a metallised carbon stick would suffice, instead of a glass tube filled with metallic powder—a stick which when red-hot has been dipped in mercury and made to imbibe particles of that metal in its pores; or the stick may be impregnated with perchloride of platinum. In effect, under any and all of these arrangements, there are little globules or particles of metal which move one among another by any stretching, pulling, squeezing, bending, or vibrating; and a sound accompanies every such motion, inaudible to human ear until these beautiful experiments had been made. Hughes placed two French nails parallel on a table, and a third on them at right angles; the heads of the lower nails were connected with an electric circuit. When he talked or sang to the upper nail, he made it dance (though imperceptibly); this dancing varied the pressure of the nail upon the two beneath it, and produced a current which was reproduced as audible sound. Sticks of carbon would suffice instead of nails.

Thus advancing step by step, Professor Hughes combined the several parts which constitute the microphone, and which may be briefly described as follows. From a base-board or table rises vertically a thin sounding-board, on one surface of which are cemented two small blocks of gas-carbon, one near the top and the other near the bottom. The blocks are so hollowed as to form cups for the reception of two pivots, the ends of a vertical rod of carbon. It is found that any minute sound or vibration which agitates the sounding-board affects the density of the particles of carbon, and this affects the current passing through an electric wire connecting the two pivot-blocks. "Not only," to use the language of the inventor, "is articulate sound and speech taken up and transmitted to a distant station with great power and distinctness, but it detects and converts into loud noises the minutest possible vibrations. The slightest stroke or the lightest touch given to the base-board is sufficient to produce a loud grating; even the tip of a soft camel-hair pencil gently stroked along the table on which the instrument is placed is faithfully recorded as a rustling sound; and, what is still more extraordinary, the very footfalls of a little common house-fly as it walks

along the base-board are heard with unmistakable distinctness by a person whose ear is at the telephone, which may be miles away."

It must be borne in mind that for practical use the microphone is always combined in the same electric circuit with a telephone, although the two may be far asunder in actual distance; they aid each other in producing audibility out of molecular disturbance, sound out of silence.

Sheer want of space alone prevents us from noticing a multitude of varieties in the apparatus employed by Professor Hughes. It may be just mentioned, however, that a rough and ready telephone has been constructed by him out of very cheap materials—a hint to ingenious workers elsewhere. A battery of three small tumblers contained in a cigar-box, a child's money-box as a resonator, two little sticks of ordinary firewood to support the bits of metallised carbon, three French nails costing perhaps a halfpenny (the square-shank nails used by English carpenters are not quite so suitable)—all tended to show that a thorough man of science can work and make discoveries with the simplest of tools.

Opportunities are frequently afforded at the Polytechnic Institution and other public establishments of seeing the microphone in action. Either the French nails or the glass tube filled with metallic powder, either the stick of charcoal or the metallised carbon may be used, according to the facilities available for rendering the results audible to a large number of persons at once. At the Polytechnic Institution part of the apparatus was in the small theatre or hall, the rest at a house in Cavendish Square, the two portions being connected by an electric wire. The sounds from the stroke of a feather, from the fall of a bit of paper, from the ticking of a watch, from the playing of a musical box—all reached the ear audibly after travelling through a quarter of a mile of wire.

No wonder that the minds of thoughtful men are endeavouring to peer into the future of this marvellous instrument. The touch of a finger comes out like the rustle of a distant forest; the touch of a camel's hair brush on a card reveals itself as a loud whisper; the tick of a watch or the beat of the pulse is heard through distances to which no one at present can assign a limit. As to the sound of a fly, Mr. Preece says, "I have myself heard the tramp of a little fly across a box, with a tread almost as loud as that of a horse across a wooden bridge." A remarkable sound accompanies this little march or tramp, half-

humorously described as the neighing of the fly's proboscis. "It is hoped," says one investigator, "that the microphone will convey to us the hidden ripple of the sap rising in growing trees and plants, which Humboldt said might be a continuous melody in the auditory organs of earth's smallest creatures. Even to hear grass grow may be possible." Being more delicate than the stethoscope or the sphygmograph, it may possibly excel them in detecting the sounds and movements of the pulse and heart. May it not to some degree lessen the social disadvantages of the deaf and dumb? May it not be possible to make molecular motion audible; to hear minute vibrations in a mass of heated metal; to detect by audibility the changes going on during chemical composition and decomposition; and would not these advantages conduce greatly to the progress of many chemical manufactures and practical arts? Surgeons are enquiring whether the existence of a hidden bullet in a wound might be discovered by the microphone; or a broken bit of bone in wounded flesh; or the buried stump of a tooth in the gums; or whether the operations of lithotrity could be facilitated, in detecting the existence of small hard substances by the infinitely minute sounds they give forth?

The Phonograph.—Difficult it assuredly is to determine, among this novel and beautiful group of acoustic inventions, which excites one's surprise in the greatest degree. It transcends all our usual ideas to be told that we can hear a friend's voice a hundred miles off. Yet such is the case with the telephone. As has been shown in the foregoing pages, talking, laughing, singing, and instrumental music can be and have been heard at even greater distances than this; although practical applications usually range within a more limited space. Then, what a strain it gives to one's ordinary notions to be told that sounds never before heard by human ears can be rendered audible, and that minute sounds can be magnified enormously in intensity. Yet such is the case with the microphone. Lastly, who would not be astonished at a sheet of tinfoil talking and singing to us, and being able to achieve this after travelling thousands of miles by ocean-post? Yet such is the case with the lately-invented apparatus known as the *phonograph*, under circumstances which we now proceed to consider.

To obtain a permanent visible record of sounds is not now attempted for the first time. M. Léon Scott's *phonantograph*, and some of the inventions of Wheatstone and Marcy, have made

a creditable advance in this direction. More especially has Mr. W. H. Barlow, in his *logograph*, invented an apparatus enabling sounds to express or imprint themselves in visible form. In his arrangement, a speaking trumpet about four inches long was connected with a tube half an inch in diameter, the other end of which, expanded or enlarged, was covered with gold-beaters' skin, or with a very thin film of gutta-percha. A spring carrying a marker pressed slightly against the skin or film. The marker, consisting of a fine sable pencil, was fed with colour or ink from a small glass tube in which it was fixed; while a continuous strip of paper was made to pass regularly under the pencil. The instrument, thus arranged, recorded every change of pressure made by the pencil on the paper; a pressure depending on the manner in which the pencil was affected by the vibrations of the film. When a breath or current was blown by the mouth through the tube, the film was set vibrating, more or less energetically according as the current was strong or weak. When words were spoken through the tube, every kind of consonant produced its own peculiar zigzag curve or undulation, marked on the paper with the coloured ink.

Ingenious as Mr. Barlow's contrivance unquestionably was, it could not reproduce the sounds which it recorded; it had no vitality in it, if we may use such a term, and in that respect differed most materially from the beautiful instrument now known as the *phonograph*.

The world knew nothing of this invention until near the close of the year 1877; when Mr. Edison came one day into the office of the *Scientific American*, at New York, and placed a small machine on the editor's table; he turned a crank-handle, and the machine began at once to talk to the editor, telling him that *it* was quite well, &c. Never before did editor light upon so strange and unexpected a special correspondent. When the fact was recorded in the pages of his periodical, the surprise of the readers and the public was great indeed; and enquiries were made—who is the wonderful magician that can achieve such a marvel? The answer was neither tardy nor complicated. Mr. Thomas Elvey Edison, of New Jersey, is (or was at that time) electrical adviser to the Western Union Telegraph Company; he had introduced improvements in the telephone, so far as regarded its electrical appliances. He himself has recorded that when, on one occasion, experimenting on that instrument, he pricked his finger, and noticed that a vibratory movement of a

stretched membrane drew out the little spot of blood into a line of peculiar form. Just as the fall of the apple suggested to Sir Isaac Newton an idea which his mind was in the right condition to seize, so did this little red spot suggest to Mr. Edison the leading idea which bore fruit in the phonograph; he worked at the conception almost night and day until he had realised it in practical form. This was followed, in December, 1877, by the startling performance at the office of the *Scientific American*, and in January, 1878, by the patenting of the invention.

The phenomenon was made known in a remarkable way to Mr. Preece, one of our foremost electro-telegraphists. Mr. Edison spoke to a sheet of tinfoil at New York (in a way presently to be described), and sent it to London by ocean mail; a fortnight afterwards Mr. Preece put the foil to an apparatus similar to that which had been used by Mr. Edison, and the foil spoke out audibly—"How do you do? What do you think of my phonograph?"

The first phonograph brought to England, in January, 1878, was described in the *Times* by a gentleman who represented Mr. Edison in matters connected with the patent. First was a brass cylinder, made to rotate on a horizontal axis by means of a winch-handle, a fly-wheel giving some approach to uniformity of rotation; the cylinder had also a power of motion longitudinally, or in the direction of the axis. Around the circumference of the cylinder was engraved a continuous spiral line, a minute groove dug into the brass. The pitch of the spiral was the same as that of the screw which regulated the longitudinal movement: insomuch that if a fixed pointer were set to the groove at any one spot, it would remain in the groove as long as the cylinder was rotating, until it worked out at the end. A thin sheet of tinfoil was bound closely and smoothly around the cylinder.

Now let us see how a singer or speaker managed to engrave his voice on the tinfoil surface of the cylinder. In front of one side of the cylinder, and directed towards the middle of its diameter, was a thin metal diaphragm or disc, provided with adjustments by which a steel point projecting from its centre could be accurately set in the groove, so as to penetrate to the full depth of the latter. On the other side of the diaphragm was a trumpet mouthpiece, something like that used with the telephone. When a voice spoke into the mouthpiece, the diaphragm was set into vibration; the steel point was set

darting to and fro, and made little digs (so to speak) into the tinfoil, not perforating it, but depressing it into the spiral groove. During the double motion of the cylinder, around its axis and in the direction of its axis, a chain of indentations was thus produced on the tinfoil. The metal point thrust the foil more or less deeply into the groove according as the loudness of the sounds, and the consequent amplitude of the vibrations, were greater or less.

But, then, how to make the tinfoil repeat audibly to the public the speech or the song which it has received? This is the most beautiful feature in the invention, and yet one of the most simple. The cylinder is brought back to its original position, and rotated; the indentations in the tinfoil give motion to the steel point; this sets the diaphragm vibrating, and gives sonorous vibrations to the air contained in the mouthpiece. The reproduction is in most particulars a reverse process to the production.

Almost every part of the apparatus has been improved from time to time, yet without modifying the leading principles. A convenient size for the cylinder is about five inches long by three or four in diameter. Tinfoil as the covering was hit upon by accident, but it is found to be an excellent material, retaining minute but permanent markings. If handled in the usual way, the same foil may be used two or three times over to reproduce the sounds; if every scientific and constructive precaution be taken, this number may be raised to fifty or more, but practical phonographers look to the attainment of ten or twelve as a fairly good result. The grooves in the cylinder being only $\frac{1}{40}$ inch in depth, the markings on the foil cannot, in any case, exceed this depth. The upper surface shows them as indentations, the lower surface as protuberances, like rows of tiny beads ranged in lines. The dots or indentations are sometimes as close as fifty in an inch, produced by the higher tones of the voice or of a musical instrument; many are round, some prolonged into dashes: and microscopic examination shows that they vary in character, number, shape, and arrangement according to the pitch, rapidity, loudness, and *timbre* or quality of the sounds which have produced them.

After Mr. Edison had experimented for awhile with a winch handle, he substituted a train of clock wheels with a descending weight as a moving power, a fly-governor being added to regulate the speed. This speed, if not maintained uniform, would make the tones of the voice or tune jump up and down without due

regard to register or pitch. When clockwork was applied, it was found that the tones given out, in reproducing the original sounds, were so steady that a dozen clerks were able to take down simultaneously and correctly a speech or reading audibly given out by the instrument. The larger the cylinder in diameter or length, or both, the longer the speech which one sheet of tinfoil could contain. The diaphragm used in the instrument is, as we have said, a thin film of sheet iron; experimentalists will gradually ascertain whether any better material can be found. The steel marker or pin attached to its centre is somewhat blunt, in order not to perforate the foil. If the spirals of the groove were $\frac{1}{20}$ inch wide apart, the groove would wind round the cylinder twenty times in an inch; and therefore the total length of groove may easily be calculated when the diameter and length of the cylinder are known.

In re-translation of the markings into sounds, the phonograph being now the speaker or singer instead of being the mysterious apparatus spoken or sung to, a paper diaphragm was at first used, with a steel spring to keep the marker or steel point properly adjusted; this and other modifications, however, do not affect the principle, which is, that the reproduction is obtained by a reverse process to that of the production. A kind of childish treble is given by a rapid rotation of the cylinder, a grating bass by a slow rotation, the best effect being produced by medium speed. The reader must clearly understand that if a message, speech, or song is to be reproduced, the self-same piece of foil must be used, whether the same or another phonograph be employed. Two friends corresponding at a distance must have two instruments exactly alike; the impressed foil must be taken off the cylinder by A, sent by post or otherwise to B, and carefully placed by B on *his* cylinder to tell him audibly what A has said. No familiarity with the instrument quite removes the sentiment of wonder at this audibility (so to speak) of dead matter. Words can be stored up and reproduced at will, at any distance of time or space; you talk to a piece of foil, and the foil *audibly* tells your friend at New York or Melbourne what you have said! A curious result may be produced by impressing two tunes successively on the same part of the same foil; by attention, the ear can detect them reproduced simultaneously.

Opportunities are gradually becoming more and more frequent for the general public to hear the phonograph. At first it was known chiefly to scientific bodies. Mr. Preece exhibited and

explained it before the Society of Telegraphic Engineers, when the queer line—"We don't want to fight, but by Jingo if we do!" was spoken by the phonograph; and immediately afterwards the child-like line—"Twinkle, twinkle, little star, how I wonder what you are." The Physical Society and the Society of Arts have in like manner had it displayed and explained. But it is now also to be seen and heard in popular places like the Polytechnic Institution, and also in school-rooms as a treat to young folk. On an occasion of the last-mentioned kind, a phonograph reproduced in succession portions of "Rule Britannia," the "Old Hundredth Psalm," the nursery story of "Old Mother Hubbard," the noises of a farmyard, a verse of "There was a Little Girl," Pleyel's "German Hymn" (sung to Chinese words after the phonograph had been audibly spoken or sung to by an Anglo-Chinese missionary), and a few sentences in French, German, and Italian.

Admiration of the unexpected effects produced by this remarkable instrument should not blind us to its shortcomings. Ingenuity has still much to do in the matter. The imitation of the sounds of the human voice is not really good, having in it too much in the nature of a husky croak. The letters *s*, *z*, and *th* are imperfectly rendered; indeed, *s* is almost lost at the beginning and ending of words. The letter *d* can scarcely be distinguished from *t*, nor *m* from *n*. Hence the words *mime*, *mine*, and *nine* sound almost exactly alike; as do *mat*, *mad*, and *nat*. Italian is found to be a better language than English for the phonograph, on account of its open vowel sounds and the distinct enunciation of all the consonants. So far as concerns actual imitation, singing is somewhat better rendered than speaking. Nevertheless, the phonograph claims to be, not merely equal, but superior to the original voice in some cases. If, for instance, the speaker has a defective lip or an ill-formed mouth, the mutilated articulations are not so perceptible in the tinfoil reproduction as in the actual voice. Some defects which a singer would rather see disregarded are recorded with provoking fidelity—as in the case of a singer who broke down at a high note, and uttered an exclamation of impatient vexation: the break down and the exclamation were alike recorded and reproduced!

A competition between a living cornet player and a sheet of tinfoil seems to be almost too ridiculous to be true; and yet true it is. In the month of June, 1878, Mr. Levy, the dis-

tinguished player on the cornet-à-pistons, in a room at New York, placed the mouth of his cornet in front of the mouth of a phonograph, and played "Yankee Doodle," first simply and then with variations. The tinfoil received the indentations in the usual way, and reproduced the tune when adjusted for that purpose. But when Mr. Edison purposely rotated the cylinder with varying degrees of velocity, the phonograph beat Mr. Levy literally out of breath; for, with a quick rotation, the pitch rose to octaves quite beyond the reach of the cornet; while, by frequently varying the velocity, the register of sounds jumped up and down in a way which neither cornet nor lungs could master. A poem was recited with a whistling accompaniment and a tune on the cornet; the phonograph reproduced all three simultaneously.

As to the possible future uses in the practical arts of life, speculation is of course permissible, so long as conjectures are kept within reasonable limits. It is, for instance, conceived as possible to receive and reproduce the songs of popular singers just as they are rendered in the opera house or concert rooms; not the mere notes as prescribed by the composer, but the peculiarities which mark the interpretation of one great singer from that of another; the original tinfoil, or a mould and cast obtained from it, would give permanence to the record of these peculiarities. The phonograph might be made to transmit an enormous mass of spoken matter, almost rivalling micro-photography in minuteness. This might be done by marking the grooves on the cylinder much closer than is now customary, insomuch that 40,000 words could be impressed by the voice on a sheet of tinfoil ten inches square. This is equivalent to saying that a speech or reading, long enough to fill seventy pages of the *Quarterly* or *Edinburgh Review*, could be transferred to a thin film of metal equal in area to only two of those pages; and as several hundred foils could be stitched into a volume (they must not be pressed, or the markings would be partially obliterated), the amount of literary matter comprised in a small space would be something enormous. The phonograph may possibly some day enable us to dispense with copying machines in many cases; for the voice can impress two tinfoils at once, one of which could be forwarded to its destination, the other kept as a record or voucher; and as this dispenses with the aid of amanuensis and copyist, you can keep your own secret if you wish. A hint has been thrown out that compositors might perhaps *hear* the matter which they have to set up, by the aid of the phonograph, thereby reserving their

eyesight for the types and the composing-stick. Witnesses in a court of justice might perchance be compelled to speak through a phonograph, thus leaving an unimpeachable record of what they really uttered. Interesting extracts or paragraphs might be read to the phonograph, and the tinfoil used many times over, to read to the inmates of hospitals and asylums. Children might be taught to read aloud difficult passages, by producing an impress on tinfoil, and reproducing from this many times in succession. The phonograph might, in the estimation of many of us, excel even the photograph in perpetuating the memory of the departed : the latter preserves the lineaments, the former the actual tones of the voice. Favourite sayings, songs, and last words, might be handed down to posterity in the tones of those who sang or spoke them. A clock, connected with a phonograph, might be so set as to act as an alarum, by causing the tinfoil to talk or sing at any prescribed hour. In America, observant men are more attentive than we in England to the phenomena of *dying languages*, languages slowly declining and decaying as society advances, as is the case among some of the many tribes of North American Indians. It has been suggested that the phonograph might possibly hand down to future ages, in well-preserved sheets of tinfoil, the actual syllable sounds and word sounds of a language, to a period when the language itself may have disappeared almost as completely as Cornish has in England.

There is no knowing how far may eventually be carried a system which was tested in a partial degree at the Paris Exhibition, in July, 1878. The mouthpiece of a phonograph was so adjusted to the mouthpiece of a telephone in one of the jury rooms at the Champs de Mars, that sounds impressed upon the phonographic cylinder were transmitted through the telephone, and heard distinctly in the telegraph reception-room at Versailles, and *vice versâ*. After this, the interlocutor at Versailles sang an original song through the telephone, and this song engraved itself on a phonographic cylinder at Paris ; the cylinder, or its tinfoil, then repeated the song, to the no small astonishment of the persons present. It is no longer Telephone *v.* Phonograph, but Telephone, Phonograph, and Co. We may add, as another hint for the future, that two singers have sung a duet through two mouthpieces into one phonograph, which reproduced the duet in proper harmony.

Dr. W. F. Channing has allowed his imagination to put forth

the possible future of the phonograph :—"We shall have galleries where phonotype sheets will be preserved as photographs and books now are. The utterances of great speakers and singers will there be kept for a thousand years. In these galleries spoken languages will be preserved from century to century with all the peculiarities of pronunciation, dialect, and tongue. As we go now to see the Stereopticon, so shall we go to public halls, to hear there treasures of speech and song brought out and reproduced as loud as, or louder, than when first spoken or sung by the truly great ones of earth." And so Mr. Edison :—"You can have a phonograph in your parlour, with an album of selected phonographic matter lying beside it ; you can take a sheet from the album, place it on the phonograph, start the clockwork, and have a symphony performed ; then, by changing the sheet, you can listen to a chapter or two from a favourite novel ; this may be followed by a song, a duet, or a quartet ; and, at the close, the young people may indulge in a waltz, all joining in it, for no one need be asked to play the dance music."

The title given to this paper limits its scope to the three beautiful instruments which have so deservedly attracted public attention within a recent period ; but there are others connected directly with them, or arising out of them, concerning which a little must be said.

The Phoneidoscope.—Mr. Sedley Taylor introduced this novelty at one of the Royal Society's soirées, and described it in "Nature" in March, 1878. It combines in a skilful manner the principle of the telephone with Newton's colours of thin plates, and with Chaldin's acoustic figures on vibrating surfaces. A kind of soap-bubble is prepared, by forming over a horizontal orifice a film of soap and glycerine ; a mouth-piece, with a flexible tube of india-rubber, being adjusted below the film. When the film, by the gradual lessening of thickness, becomes so attenuated as to show Newton's colours, or what in familiar language we may call soap-bubble colours, an operator sounds a vocal note into the mouth-piece. The pulsations thus produced throw the film-colours into beautiful patterns, with vortices of varying hue and tint here and there rotating swiftly, and producing singularly charming effects. The patterns and vortices, nodes and ventral segments, vary according to the pitch of the note ; and hence a long succession of changes can be brought before the eye of the observer, until the film becomes so thin as to break. Not

only does the musical pitch of the note affect the figures and colours, but the quality also—that which the French call *timbre* and the Germans *klang-farbe*. An electric light, shining diagonally on the film, may be made to render the effects visible to a large number of persons at once.

The Microtasimeter.—This instrument detects and measures wonderfully minute changes of pressure and temperature. It was invented by Mr. Edison, as a modification of what is called the carbon telephone. The latter has a small disc or button of carbon placed between two platinum plates; one of these pinches the carbon with more or less pressure as it responds to the vibrations of a diaphragm of thin sheet iron. The carbon is a charcoal resulting from the imperfect combustion of a peculiar hydro-carbon obtained from petroleum. In the microtasimeter which, as we have said, is a modification of this instrument, two little posts or pillars rise from a base-piece, and sustain a vulcanite disc or button of prepared carbon, and other small apparatus which need not be described in detail. A small piece of any substance to be tested is screwed up, and the pressure put upon it noted by the deflection of a galvanometer. Any subsequent deflection indicates the expansion or contraction of the substance interposed. So sensitive is the apparatus that the heat of the hand imparted to a strip of hard rubber is sufficient to move a galvanometer several degrees, even when the hand does not actually touch the rubber. A still more remarkable test of its delicacy is obtained by placing a strip of gelatine near a piece of damped paper; the instrument records almost instantly the expansion of the gelatine from the absorption of moisture. The heat of the hand held six inches from the apparatus is sufficient to deflect the galvanometer mirror to such an extent as to throw the beam of light off the scale. It is even stated that $\frac{1}{50000}$ of a degree of Fahrenheit's thermometer can be measured by this means.

The Megaphone.—An instrument called by Mr. Edison the *megaphone* has been contrived to enable two persons to converse in the open air at a distance of a mile or two apart. It comprises neither magnetic nor electric appliances, neither a vibrating disc nor a metal pointer. It is in fact a pair of gigantic ear-trumpets used in combination with a speaking-trumpet.

Tough Greek names have been given to still other inventions arising out of the telephone and the microphone; but they are not sufficiently developed to call for description here.

G. Dodd.

THE PUBLIC LIBRARIES OF AMERICA.

Our American cousins have recently been taking stock. The national centenary was felt to be not merely an occasion for showing the increase in material wealth and manufacturing ingenuity, but also of exhibiting the progress of the nation in culture. There are few better tests of the educational status of a nation than the extent, condition, and usefulness of its public libraries. It is true that mere figures relating to the size and operations of libraries may be, and sometimes are, either useless or absolutely misleading. This, after all, amounts to little more than saying that, like all crude facts, they require to be interpreted with knowledge and discretion. The public libraries of a city, or of a state, are an index of the estimation placed upon books and literature by the community at large. They will in many cases, in most cases perhaps, fall short of the ideal of the best citizens, but they will represent pretty accurately the general average of the inhabitants. The present democratic tendencies of society in the Old World give a more than literary interest to the history of those measures by which the American nation, after committing its destinies to the will of the people, has contrived to infuse into them the knowledge and the wisdom requisite to keep afloat the ship of the state. In the Old World political power has been, generally speaking, confined to small circles; in the New World it has been very widely diffused. America has also had to contend with the dangers arising from the ignorance and fanaticism imported from Europe. It may safely be said that amongst the secular agencies that have contributed to the well-being of the United States, the most potent have been the common schools and the public libraries. The history of libraries in America indicates a "broadening down" of interest in literature and science, until it is no longer the exclusive possession of a caste, but is to a large extent "understanded of the common people." We have first, in the old colonial days, college libraries which were accessible to professors and students, and, no doubt, to the small circle of outsiders who were interested in the humanities. Then we have the action of the prosperous middle class to supply themselves with literary food by the co-operative agency of social or subscription libraries. The determined effort to educate young America leads to the gigantic experiment of the common school libraries. The more than partial failure of this new departure is compensated by the rapid growth, wide extension, and

popular appreciation of the free town libraries. The Americans have faith in books. They believe in books for the student in the college, for the preacher in the study, for the child in the common school, for the prisoner in the jail. This faith is shown in the progress made in the century from 1776 to 1876. At the former date there were "twenty-nine public libraries in the thirteen American colonies, and they contained 45,623 volumes; in the year 1800 the number of libraries had increased to forty-nine, and the number of volumes to about 80,000; in 1876 there are reported (including the society libraries of students in colleges, reported separately) 3,682 libraries, numbering in the aggregate 12,276,964 volumes, besides 1,500,000 pamphlets; the latter very imperfectly reported." These figures do not include the libraries of churches and Sunday schools, which contained 10,000,000 volumes at the census of 1870.

These figures, and the greater part of the information given in this article, are derived from the special report on the history, condition, and management of the public libraries in the United States of America, which was prepared for the Bureau of Education, and formed part of its exhibit in the Centennial Exhibition. This is probably the most suggestive volume ever issued on the subject of libraries. It is not a mere mass of statistics. Notwithstanding its enormous bulk, we should describe it as a "live" book. General John Eaton secured the co-operation of Messrs. Justin Winsor, W. F. Poole, Melvil Dewey, F. B. Perkins, and other well-known bibliographers. They not only describe the history of American libraries, but they discuss many points of importance connected with their management. The great bibliothecal bugbear of catalogues is amply illustrated, the best methods of organisation, the most appropriate form of buildings, the binding and preservation of books, the best method of utilising the vast material lying hidden in periodical literature, and many other topics are canvassed. It is a matter of which our Transatlantic cousins may be justly proud, that theirs should be the first nation to issue such a document. The history of the public libraries of America, in spite of all defects and mistakes, is full of credit and instruction. It epitomises the history of American culture.

College Libraries.

The English settlers in America early turned their thoughts to schools and learning. Thus in the abortive settlement at James-

town, Virginia, Sir Edwin Sandys obtained a grant of 15,000 acres of land for a college at Henrico, and a sum of 1,500*l.* was contributed in response to a "brief" issued by James I. One anonymous donor sends "Augustine de Civitate Dei, Master Perkins, his workes, and an exact map of America," and Mr. Thomas Burgrave, a deceased minister, left his library, valued at 100 marks. The disaster of 1622 overwhelmed the infant colony, and sixty years elapsed before Virginia saw the birth of a college, which still lives, the second in point of age in the United States.

The oldest educational institute is the venerable University of Harvard, which is contemporaneous with the foundation of the Puritan Commonwealth. Its early progress was slow, and a fire in 1764 left but a handful of the books which had belonged to it in its youth. In 1790 there were 12,000 volumes. It has now 154,000 books, with as many pamphlets, while the united libraries, including society libraries, of the university, contain 227,650 books. The rapid growth during late years has been very marked. Special attention has been paid to the acquisition of pamphlets, of which it has now a very remarkable collection. There are doubtless many who regard such ephemeral trifles as unmitigated trash, but to the student of history they are invaluable. Not only do they show the form and pressure of the age, its weaknesses and follies, as well as its aspirations and heroism, but it is in these byeways of literature that many of the facts relating to the progress of social reforms, and the birth of important inventions and discoveries have to be sought. An inquiry was made in 1857 into the then condition of the library, and great efforts were made by its friends to supply the many deficiencies thus made apparent. Harvard Library has had many liberal benefactors. In 1818 Mr. I. Thorndike presented the library of Professor C. D. Ebeling, of Hamburgh, the largest collection then existing of books and maps relating to America. The Hon. Charles Sumner gave during his lifetime more than 250 maps, 1,300 volumes, and from 15,000 to 20,000 pamphlets, and at his death he bequeathed 4,000 volumes more. Mr. Sumner stated that the many pamphlets presented to him by the authors were far more accessible to him at Harvard, where they were classified and catalogued, than they would have been in his own house. Prescott gave the books he had used in writing his "History of Ferdinand and Isabella," and Dr. Worcester the philological apparatus used in the preparation of his great dictionary. These are but a few of the many notable gifts which

Harvard has received. Amongst the minor donations is one of thirty-nine volumes sent by Goethe. In addition to the general library there are separate collections belonging to the Dane Law School, Divinity School, Medical College, Museum of Comparative Zoology, Boylston Hall Chemical Library, Lawrence Scientific School Engineering Library, Botanical Garden, Phillips Library at the Observatory, Agricultural Library of the Bussey Institution. The societies formed by the students are also in some cases the possessors of collections of books. The Institute of 1770 has about 3,500 volumes, the Porcellian Club has 7,000 well-bound volumes, the Christian Brethren 100, the St. Paul's Society 500, the Natural History Society 500, and the Hasty Pudding Club 4,000 volumes.

Amherst College dates only from 1821, but has over 30,000 volumes. These have been classified in accordance with the highly ingenious decimal system devised by Mr. Melvil Dewey. The books are divided into nine classes—(1) Philosophy, (2) Theology, (3) Sociology, (4) Philology, (5) Natural Science, (6) Useful Arts, (7) Fine Arts, (8) Literature, and (9) History. These special libraries are then considered independently, and each one is separated again into nine special divisions of the main subject, and numbered. Thus 59 is the ninth division, Zoology, of the fifth class, Natural Science. Each of the divisions is formed into nine sections. Thus 513 is the third section, Geometry, of the first division, Mathematics, of the fifth class, Mathematics. This classification has been carefully worked out by Mr. Dewey, and has many practical advantages. It is one of the most philosophical and practical schemes yet devised for the systematic arrangement of books upon the shelves of a library.

Yale College was founded in 1700, by eleven ministers nominated for the purpose. "Each member brought a number of books and presented them to the body ; and, laying them on the table, said these words, or to this effect : I give these books for the founding of a college in this colony."

President Clap, the historian of the college, records donations from Sir I. Newton, Dr. Halley, Sir R. Steele, Dr. Bentley, and Dr. Calamy. Berkeley sent them "the finest collection of books that ever came together at any one time into America." Mr. Daniel Turner sent "sundry volumes of his own works on physic and chirurgery," and other books, "whereupon the trustees sent him a diploma, creating him Doctor of Physic." The difficulties of cataloguing were grappled with and apparently

overcome in 1742, when Mr. Clap remarks :—"Before this time there never had been any perfect catalogue of the books in the library, for want of which the students were deprived of much of the benefit and advantage of this. The rector, therefore, placed all the books in the library in a proper order (but in honour to the Rev. Dr. Berkeley, for his extraordinary donation, his books stood by themselves at the south end of the library), and put a number to every book in its proper class and lot, and took three catalogues of the books as they stood in their proper order on the shelves, and another in an alphabetical order, and a third, wherein the most valuable books were placed under proper heads, according to the subject-matter of them, together with figures referring to the place and number of each book, by which means it might easily be known what books were in the library upon any particular subject, and where they might be found with the utmost expedition. This catalogue was printed and was a great excitement to the diligence and industry of the scholars in reading them." (P. 29.)

Yale College has now over 80,000 volumes, without including the libraries of various departments of the university, some of them of considerable importance. Amongst the many gifts that Yale has had, we may name the gift in 1870, of his 3,600 oriental books and 90 MSS., by Professor E. E. Salisbury, who also gave 6,000 dollars, and an annual gift of 600 dollars.

The Cornell University, established in 1868, has already an important collection of books, which includes the library of Franz Bopp, and a large number of historical books presented by Professor Goldwin Smith. To these have been added the library of Jared Sparks, the editor of the works of Washington and Franklin, and the books on slavery and the anti-slavery agitation, given by S. J. May, since increased by books from the libraries of Gerrit Smith, R. D. Webb, of Dublin, H. B. Stanton, and other well-known abolitionists. The books on electricity and telegraphy, collected by S. F. B. Morse, have also been added. The library has also many works illustrative of the history of typography, and of architecture, and a small collection of illuminated MSS.

Amongst the younger libraries, that of Wellesley College, Massachusetts, deserves special mention. It only dates from 1875, but has a library of 10,000 volumes. The institution is one for the education of young women. The collection of books is chiefly from the well-selected private libraries of the founders

of the college. Good editions of the best books in the literature of all times have been selected and handsomely and appropriately bound. There is very little "lumber," and a student of the humanities might pass many pleasant hours amongst its alcoves. There is a small collection of critical apparatus for the study of the Bible. This is named the Gertrude Library, and was presented as a memorial to a deceased daughter.

The college libraries, although in many instances hampered by want of funds, are showing many signs of vigorous growth. A question of importance is, whether one large library is not less useful than a series of smaller special collections, located in the lecture-rooms, so that the professor of chemistry, for instance, shall have his literary apparatus as close at hand as his philosophical instruments, and be able to refer his pupils to the literature of his subject, without the delay of sending to the library. This is a matter which the test of experience can readily decide. College libraries should be regarded chiefly from the utilitarian standpoint. They are not, in the majority of cases, places where bibliographical rarities will be stored. They are not treasuries of the past, but armouries, whence may be drawn weapons for the battle of the present. The fullest liberty of access and latitude of use should be accorded. A Sunday reading-room is one of the suggestions made by the editors of the report.

Medical and Professional Libraries.

The largest medical library is that of the Surgeon-General's office, deposited in the Army Medical Museum at Washington. It has 40,000 volumes of books and 40,000 pamphlets, or about 70,000 titles, and is strong in modern literature, but has naturally many deficiencies in the earlier books. It has a few MSS. amongst them, a fine copy of the *Lilium Medicinæ*, of Bernarde Gordon, dated 1349. Dr. J. S. Billings, whose knowledge of medical bibliography is almost unrivalled, is carrying out a system of indexing the original articles in medical journals. It is estimated that 1,147 periodicals devoted to the healing art have been started since the *Nouvelles Découvertes* in 1679. Of these the library has about 75 per cent. Another extensive and important branch of medical literature is formed of dissertations for the doctorate and similar academic theses. The Surgeon-General's Library contains 40,000 of these. In these monographs we need not look for any great novelty of treatment or fresh discoveries, but they represent the state of knowledge and of opinion at

particular epochs on the topics of which they treat, and not unfrequently they record special investigations. In addition they have an undeniable value in relation to medical biography. The largest medical libraries may be ranged in this order: Surgeon-General's office, 40,000 volumes and 40,000 pamphlets; College of Physicians, Philadelphia, 18,000; Pennsylvania Hospital, 12,500; New York Hospital, 10,000. Medical literature forms an important feature of some general libraries, thus the Boston Public Library has about 11,000 volumes.

Professor Theodore Gill does not speak in very enthusiastic terms of the scientific side of American libraries, but names the Boston Public Library, the Astor Library, the Peabody Institute of Baltimore, and the Library of Congress, which now includes that of the Smithsonian Institution.

It is not surprising to find that there are but few special theological libraries in the United States. They are rare everywhere, although the divinity departments of universities doubtless contain large and valuable collections. Only two theological libraries date from the 18th century. The oldest appears to be the Library of St. Mary's Theological Seminary of St. Sulpice, in Baltimore, which now contains 15,000 volumes. The largest appear to be the Union Theological Seminary of New York and the Andover Theological Seminary, which have each 34,000 volumes.

Dr. S. B. Griswold, in a chapter on law libraries, has the following remarks:—"A review of the catalogues of the law libraries of those countries which have adopted the common law, shows that no one is so rich in collections of books that appertain strictly to the law as our own. While the English libraries have, perhaps, more books relating to the early Roman law, and more of the earlier treatises upon the common law than the American, yet, in the department of reports, the American libraries far exceed the English.

"A complete series of the English, Irish, and Scotch reports may, indeed, be found upon the shelves of several, if not all, of the public law libraries of England; but not one, not even the British Museum, has a complete set of the American reports. In this country, however, as has been shown, several libraries, State and Association, have complete sets of the English, Irish, Scotch, and American reports, numbering more than 4,000 volumes. Again, the English libraries have comparatively few of the American treatises, and are very meagre in American statute law, while the American libraries have very full collec-

tions in these departments, and all of the principal English treatises, together with a complete collection of English statutes." (P. 168).

Social Libraries.

The social libraries owe their origin to Franklin, whose own childhood was marked by a passionate love of reading for which there was very little food. When a young man, just establishing himself in Philadelphia as a printer, he, in conjunction with some friends formed a debating society known as the "Junto." This almost casual meeting of young men afterwards developed into the American Philosophical Society. The literary famine may be best described in Franklin's own words :—

"At the time I established myself in Philadelphia, there was not a good bookseller's shop in any of the colonies to the southward of Boston. In New York and Philadelphia the printers were indeed stationers; they sold only paper, &c., almanacs, ballads, and a few common school books.

"Those who loved reading were obliged to send for their books from England; the members of the Junto had each a few. We had left the ale-house where we first met, and hired a room to hold our club in. I proposed that we should all of us bring our books to that room, where they would not only be ready to consult in our conferences, but become a common benefit, each of us being at liberty to borrow such as he wished to read at home. This was accordingly done, and for some time contented us. . . . . The number was not so great as we expected; and though they had been of great use, yet some inconveniences occurring for want of due care of them, the collection, after a year, was separated, and each took his books home again. And now I set on foot my first project of a public nature, that for a subscription library . . . . I drew a sketch plan and rules that would be necessary, and got a skilful conveyancer, Mr. Charles Brocksley, to put the whole in form of articles of agreement to be subscribed, by which each subscriber engaged to pay a certain sum down for the first purchase of books, and an annual contribution for increasing them. So few were the readers at that time in Philadelphia, and the majority of us so poor, that I was not able, with great industry, to find more than fifty persons, mostly young tradesmen, willing to pay down for this purpose forty shillings each, and ten shillings per annum. On this little fund we began. The books were imported; the library

was open one day in the week for lending to the subscribers, on their promissory notes to pay double the value if not duly returned. The institution soon manifested its ability, was imitated by other towns and in other provinces. The libraries were augmented by donations; reading became fashionable; and our people having no public amusements to divert their minds from study became better acquainted with books, and in a few years were observed by strangers to be better instructed and more intelligent than people of the same rank generally are in other countries." (P. 4.)

The Philadelphia Library Company prospered, and in course of time absorbed some smaller rivals. One of the honorary members of the Library Company was James Logan, who had collected a valuable series of works of classical literature. He was a reader as well as a collector, and at sixty amused himself by making a translation of Cicero de Senectute. He tells us of the gift of a rare Ptolemy from his "learned friend Fabricius." His intention to devote his books to the service of the public was loyally carried out by his widow and heirs. The trust contains a stipulation that one of Logan's descendants taken in priority of birth, but preferring male to the female line, should be the librarian. This is said to be the solitary instance of an hereditary office in America. In 1792, the Loganian library became vested in the Philadelphia Library Company. The stormy period of the revolution did not affect the library. The managers were patriotic enough to allow the members of the Congress to have books free of charge, and sufficiently polite to allow the British officers the same privilege for payment.

The Philadelphia Library was the fruitful "mother of all the North American subscription libraries." The story of the difficulties attending the formation of some of these institutions add some new items to the curiosities of literature. Thus the Coon Skin Library at Ames, Athens county, Ohio, was raised by a subscription amongst poor pioneers, chiefly the result of a coon hunt. Amongst the contributions were ten coon skins, given by a boy of fourteen, afterwards well known as the Honourable Thomas Ewing. The books were bought at Boston by Squire Sam. Brown, who brought them back in a sack on a pack-horse. The influence of this small library was very great and beneficial.

Mercantile libraries appear to have originated about the same time as the "Mechanics' Institute" system in England. That of

Boston was established in 1820, and the latest addition to the class was one formed at Galveston in 1870, and which three years later became a free town library. They are co-operative associations, and the members' roll would probably show that in most cases a very liberal interpretation is given to the chief term in their title. They are not at present an increasing class, and are likely to become merged in town libraries unless they can respond to some want of the middle class which the municipal institutions do not supply. The resemblance to our mechanics' institutes extends in some cases to the provision of lecture courses, gymnasia, and educational classes. The New York Mercantile Library has 160,613 volumes. The Boston Athenæum has 105,000. The Baltimore Mercantile Library, which only commenced in 1857, has already over 50,000 volumes.

The Young Men's Christian Associations have in many cases libraries as part of their missionary effort for the moral and spiritual benefit of the young men, clerks, and artizans, who form the bulk of their members. There are 478 such associations, and their member-roll has 26,000 names inscribed. These libraries will not have any bibliographical importance, and in some cases are a mere handful of books, but in others, although small, they are well selected, and likely to be used and useful. "Some of them are open during a large portion of each Sunday, though this is far from being an invariable practice among these societies." (P. 387.)

Government Libraries.

The Library of Congress dates from 1800, but the small collection was consumed on the burning of the Capitol by the British in 1814, and the library of ex-President Jefferson then overtaken by financial difficulties was bought, after vigorous opposition, as the foundation of a new library. This, with the exception of 20,000 of the more valuable books, was destroyed by fire in 1851. The new building was fire-proof in construction, walls, ceilings, and shelves being made of solid iron, highly finished and decorated. In the year 1866 the library received its most important addition by the transfer to it of the collection belonging to the Smithsonian Institution, and forming one of the most valuable scientific libraries in the world. The liberality with which the Smithsonian Institution presents its publications to learned societies all over the world secures it a return of "society literature" of almost unequalled richness. By the

arrangement with the Congress Library the regents are relieved of the expense of maintaining this collection. The Force Library, a remarkable collection illustrative of American history, was bought in 1867 for 100,000 dollars. The central idea of the Library of Congress was that of a collection relating to law and government, but it has now become strong in other directions, and promises to become a national library worthy of the wealth and culture of the American people. It now contains 300,000 volumes and a large collection of pamphlets. Since 1870 the operation of the new Copyright Act, which requires the deposit of a copy of each publication as a condition of perfecting copyrights, has added largely to the collection. There are, on an average, 12,000 copyright entries each year; but these include not only books, but periodicals, engravings, maps, and music. In the catalogue department an index is being compiled to the subjects of the documents and debates of Congress, which extend to about 1,600 volumes.

The Library of the Department of State originated in the necessity of having accessible the statutes of the several States in the Union, but it has grown into a valuable library especially strong in jurisprudence, diplomatics, and history. It has nearly 5,000 volumes of newspapers, including those of South America and the West Indies. The local statute law extends to 6,700 volumes.

The Bureau of Education has also a special library containing 5,000 volumes and 15,000 educational journals and pamphlets. This collection is a mirror of the educational agencies at work in the Old and New World.

The Patent Office has a technological library of about 23,000 volumes.

Public documents and works printed at the expense of the Government have been distributed with much greater liberality in America than in England. It is, therefore, a matter of surprise and regret to find that no library possesses a complete set of the documents issued by the General Government.

In addition to the libraries belonging to the central authorities, each state and territory has its collection of books in the capital city. These are maintained and increased by annual grants, by exchanges and by gifts. The exchanges are chiefly of official publications. These libraries are usually free to all persons who may desire to read in the rooms. The number of books and pamphlets in libraries of this class is estimated at

833,219, the largest being that of New York, which has 95,000 volumes. One important function of these libraries is to preserve all the official documents and other works illustrative of the jurisprudence and history of the state to which it belongs. Complete sets can only be made by unremitting watchfulness, and it is said that not one of the older states has a complete series of its own publications. In New York the Secretary of State is directed to deliver all such documents of historic interest as he might deem desirable and proper to be so transferred.

Historical Societies.

The numerous historical societies existing in the United States have had no inconsiderable influence upon the culture of the nation. They have mainly directed their attention to the local antiquities of the districts to which they belong, but have not in all cases confined themselves to that restricted field of investigation. The extent of their libraries is estimated at 482,000 books and 568,000 pamphlets. The Massachusetts Historical Society has a thousand volumes of MSS. The libraries are mainly organized for the use of antiquarian students, but in some the wants of the general public have been considered. In some cases interesting museums have been formed. Like similar societies in England many of them publish "Transactions," and it is estimated that "the number of printed pages issued by them, chiefly during the last seventy-five years, is equal to more than 300 volumes of 350 pages each." There are about 160 of these societies, though a few of them are more or less dormant. The same feeling which gave birth to these societies has secured for many towns a local history at the expense of the community. In several states the statutes provide that a town may authorize its authorities "to contract with some person to prepare and publish the early history of such town, at the expense of the town, under such restrictions and regulations as such town shall prescribe." These historical societies we may hope will lead to greater care in the preservation of the documentary material upon which alone satisfactory history can be built. They should also preserve the ephemeral matter of the present day, which in the future will be so difficult to find. What are easier to obtain whilst they are new than playbills, election squibs and similar straws, showing which way the wind blows, and yet how much we should prize a collection of such unconsidered trifles of the age of Elizabeth?

Prison Libraries.

As early as 1802 the inspectors of the Kentucky Penitentiary framed a rule that convicts should be encouraged to "employ any leisure time in reading," but whether any practical result came of it is not known. The reformers of prison discipline have not failed to appreciate the ameliorating influences of good books. Several prison libraries owe their formation to the practical benevolence of individuals. The library of Alton Penitentiary, Illinois, was founded in 1846 by the convicts in Charlestown, Massachusetts. This odd incident is thus recorded (p. 220) :—"About a year ago a clergyman from Alton, Illinois, visited the prison, and was requested by the chaplain to perform the evening service ; after which he made a short address to the prisoners—a mark of attention from a stranger which always gives pleasure. He expressed his high gratification with the neatness, order, and contentment which prevailed there, and his particular delight in seeing the library, observing that they were much better off in this respect than the inmates of the State prison at Alton, who had no books at all. The next day, as the chaplain was walking through one of the workshops, a prisoner having asked leave to quit his work and speak to him, told him that he had some books which he could spare, and should like to send to the prisoners at Alton, if permitted, and so had some of his shopmates. The chaplain having conferred with the warden, stated in the chapel after evening prayers, that such an application had been made to him, and added that if any prisoner had books which he wished to send to Alton prison he might leave them in the adjoining room on coming to prayers the next morning. He also sent word to his friend the clergyman that if he would call at the prison the next day he would find some books for Alton. The reverend gentleman went accordingly and took with him a large silk handkerchief to carry off the books. What was his astonishment to find, in the room adjoining the chapel, more than 400 bound volumes, besides tracts and pamphlets. The silk handkerchief would not do, and the prisoners requested permission to make boxes to pack the books in."

The largest of these prison libraries is that at the Philadelphia Eastern District Penitentiary, which has 8,737 volumes. There is a curious concurrence of testimony as to the great use made of these libraries, and as to their good effect upon minds immured in these tombs for those alive. One chaplain

declares the prison library to be "one of our most efficient agencies for instruction and amusement." Reformatories and refuges have also, in many cases, libraries attached to them. The largest of this class is the New York House of Refuge, which has 4,000 volumes.

Common School Libraries.

The desire to see the pleasures of literature tasted by the masses of the people has led to legislation for the alliance of libraries with those common schools which are so distinguishing a feature of America. In New York, after some partial failures, a law was passed in 1838 which was to place, within fifteen years, over 1,600,000 books on the shelves of the school libraries. After some years of progress these libraries began to decline, those in the rural districts being almost unused. They were "mainly represented by a motley collection of books, ranging in character from Headley's 'Sacred Mountains' to the 'Pirate's Own Book.'" An expenditure of 139,798·10 dollars in five years had for result a loss of 81,995 volumes. It must not be supposed that in all the states where this experiment has been tried it has been equally unsuccessful, but the want of supervision and responsible control has been fatal in many instances.

The failure of the common school libraries appears to be chiefly due to a want of attention to the details necessary for the smooth working of such a system. This appears more probable when we find that the neighbouring province of Ontario, Canada, has witnessed its successful working since 1854. They are managed either by municipal councils or by school trustees. "The books are procured by the Education Department from publishers both in Europe and America, at as low prices for cash as possible; and a carefully prepared classified catalogue of about 4,000 works (which have been approved by the Council of Public Instruction) is printed and sent to the trustees of each school section, and the council of each municipality. From this select and comprehensive catalogue, the local municipal and school authorities, desirous of establishing and increasing a library, select such works as they think proper, or request the department to do so for them, and receive from the department, not only the books at prices about from 25 to 35 per cent. cheaper than the ordinary retail prices, but an apportionment in books of 100 per cent. upon the amount which they provide for the purchase of such books. There is also kept in the depart-

ment a record of every public library, and of the books which have been furnished for it, so that additions can be made to such libraries without liability to send second copies of the same books." (P. 57.)

Free Public Libraries.

Boston had a public library of some kind in the seventeenth century. It is supposed to have perished in the great fire which destroyed the Town House in 1747. The earliest instance of the application of public funds to the maintenance of a free library appears to be at Annapolis, where, in 1697, Governor Nicholson proposed that the King "be addressed that some part of the revenue given toward furnishing arms and ammunition for the use of the province be laid out for the purchase of books, to be added to the books which had been presented by the King, to form a library in the port of Annapolis; and that a portion of the public revenue be applied to the encouragement thereof; and that the library should be placed in the office and under the care of the commissary of the province, permitting all persons desirous to study or read the books to have access thereto under proper restrictions (p. 35)." There appears to have been a free library in New York as early as 1700, owing to the bequest made by the Rev. John Sharp, who left his books for a public library. The time, however, was not ripe for the success of such an experiment, and, after neglect and misuse, the residue of Sharp's library was merged in one belonging to a society.

The Astor Library, New York, was founded by a bequest of 400,000 dollars, made by Jacob John Astor, in 1848. The selection of the books mainly devolved upon Dr. Joseph Cogswell. It was not opened until 1854, when it had 80,000 volumes, selected with rare knowledge, and with a systematic endeavour to make it fitted to help scholars, investigators, and men of science. The library has now 152,000 volumes. The library has had a munificent benefactor in the son of the founder. It has received from J. J. Astor and W. B. Astor not less than 773,000 dollars.

New York has another remarkable library, founded by private liberality. The Lenox Library owes its existence to James Lenox; and, when it was his private collection, it was famous for its remarkable richness in books relating to early American history and in Shakesperean literature. His gifts to the institution, exclusive of books, are estimated at 700,000 dollars.

The first place amongst the free town libraries belongs to

Boston. It was projected in 1848, and amongst those who took an interest in it were George Ticknor and Edward Everett Mr. Joshua Bates, a wealthy merchant, gave it 50,000 dollars, which were funded. It was opened in March, 1854, but the present edifice was dedicated January 1, 1858, having cost with the land about 365,000 dollars. Mr. Bates made a gift of books of equal value to his previous donation. The sons of Dr. Bowditch gave their father's mathematical library, the noble-hearted Theodore Parker left his learned library of 12,000 volumes, Mr. Ticknor gave it his Spanish and Portuguese books and a fund of 40,000 dollars for their increase. The Prince Library, rich in Puritan theology and in the early history of New England, has since been added to it, as well as the Barton collection, which includes the best Shaksperean collection in America. It has also received some important donations in money. Thus the Honourable Abbott Lawrence left 10,000 dollars, Miss Mary P. Townsend left 4,000 dollars, and the Honourable Jonathan Phillips left 20,000 dollars. The minor gifts in money and books have been far too numerous to be separately named. In 1872, a system of popular branch establishments was commenced, and there are now six of them. The total number of volumes is 300,000.

The managers of the Boston Library have set themselves the task of showing how the public library can be made an instrument for the higher education of the people. It has had the funds to carry on the experiment with a completeness and energy that would not have been possible in a less wealthy community. Instead of attempting to evade the obvious necessity of satisfying all kinds of tastes not vicious or immoral, they have frankly admitted the right of the public to have what books they desire. They have at the same time tried, and with no small measure of success, to lead readers to higher levels of intellectual interest, and to help all students to the fullest acquaintance with the capabilities of the library. There are no more remarkable examples of popular bibliography than the various catalogues and helps published by the Boston public library. By class-lists, by annotations, by special issues, they have laid readers under a debt of gratitude, and no doubt have brought many good books into the hands of earnest students, who, but for such suggestive help, would have remained ignorant of their existence. The great literary problem is that of selection. This is necessary for even the greatest library; it is still more necessary for the

individual student, and, under the inspiration of Mr. Justin Winsor, who for ten years directed the Boston Library, it has done much to help him in this direction. Mr. Winsor last year, owing to the action of some members of the City Council, who showed a striking inability to understand the relations of a librarian to the public, has ceased to be the superintendent of the Boston Library, and has accepted the invitation of Harvard College, where he will be librarian, and practically the first of those professors of books and reading whose establishment Emerson long ago suggested.

The Saint Louis Public School Library has grown from comparatively humble beginnings into a large and important collection. As a library of consultation it is free to all, but the right of borrowing books is restricted to persons paying a small annual subscription. The Academy of Music, the Medical Society, the Institute of Architects, and other local societies have, by special arrangements, deposited their collections with the public library, which is thus strengthened in many important departments. It is curious to notice that, whilst Sunday opening was a failure in the Mercantile Library, it has been very successful in connection with the Public School Library. The early progress of the library was greatly helped by the efforts made to interest the children in the public schools. A liberal supply of books, suited to juvenile reading, no doubt helped to cultivate a taste for reading, and secured the goodwill of those who were just acquiring the power of literary cultivation, and for whom habits of reading and self-culture were highly desirable.

The Cincinnati Public Library has had a chequered, but, on the whole, prosperous career since it commenced as a school library, in 1856. It now possesses 91,000 volumes, placed in a specially-constructed building, with a reading room, said to be one of the largest and finest single apartments in the world, and having a shelving capacity for 250,000 volumes. Here, also, the experiment of Sunday opening has been tried with happy results, the readers now averaging a thousand a day.

The Chicago Public Library is a lasting memorial of the sympathy felt for the loss of her literary resources sustained by that city in the great fire of 1871. Mr. Thomas Hughes, Q.C., the author of "Tom Brown's Schooldays," suggested a subscription of books, to which Queen Victoria, the British Museum, the University of Oxford, and many others so liberally responded that 7,000 volumes were sent to Chicago as a mark of English

sympathy. The library has now over 50,000 volumes, and is under the management of Mr. W. F. Poole, the well-known author of the "Index to Periodical Literature." The reading room is open on Sundays, and has an average of 560 readers.

By the liberality of one of her citizens, Chicago is likely to have the finest reference library in America.

The funds left by the late Walter L. Newbury, for the foundation of a free public library in the north division of Chicago, are estimated to be worth 4,000,000 dollars. This is double the sum that has been expended upon the Astor Library, and will enable the trustees to build up a magnificent collection of books for the use of students of Chicago, and of the district of which it is the metropolis.

What may be called patronymic libraries are becoming increasingly common. The Astor and Peabody benefactions are not isolated instances, but types of a class. In twenty years the State of Massachusetts has seen the foundation of sixteen libraries bearing the names of their founders. This is a form of public spirit not confined to one locality, but widely diffused and increasing.

The free reading room is an important adjunct to the library. The newspaper and the periodical are rather a necessity than a luxury of modern life. At the Cooper Union, in New York, there are 318 papers and periodicals filed, and about 100 magazines, in different languages. The rooms, which are open from 8 A.M. to 10 P.M., have been used by 581,798 persons in one year.

The examples we have so far given have been mainly, if not entirely, from the Northern States. In the South many valuable private libraries perished in the Civil War. Public libraries, however, never flourished there to the same degree as in the North. The Charleston Library Society originated in seventeen young men, who formed themselves into a society to collect "such new pamphlets and magazines as should occasionally be published in Great Britain." This library grew slowly, but acquired some works of great value—the "Description de l'Egypte," for instance. Since the conclusion of the war, in which some of its books were lost, it has assumed a more popular form, and is making steady progress. "A view of the condition of the public libraries in the Southern States presents, after all, but a barren prospect. In proportion to the population, their number is exceedingly small; they are poorly supported; are conducted on no general or fixed system, and are confined usually to the large cities, while

the smaller communities in these states are, for the most part, absolutely destitute of this most necessary means of education and refinement." (P. 890.)

Amongst the free libraries it would be unpardonable to omit the quaint Germantown Friends Free Library and Reading Room, where they have tried the experiment of excluding all works of fiction, and of placing only books of healthy moral tone upon the shelves. The library is maintained by voluntary contributions, and is housed in a fine hall, mainly built at the expense of one citizen.

In the work of popular education the free library system, both in America and at home, is doing a great work, and if wisely directed may be a more potent instrument in the future than it is at present. The town libraries should become what they have indeed, been called, and in some instances already are, people's colleges. A sympathetic librarian will be able to give valuable advice to his customers as to the direction their reading should take, and lead many others from desultory and purposeless reading into real and systematic study.

The town library represents the aspirations of the people, and must, within reasonable limits, minister to the intellectual requirements of all classes. This is liable to abuse in diverse directions. Books appealing to limited sections of the community are inappropriate purchases, except for a wealthy institution. There is little fear of error in this direction, but there is some danger that a cheap popularity may be obtained by pandering to a low taste for demoralizing fiction. The town library is the natural complement of the public school, and under wise management may do much to direct the power of reading acquired at schools into healthy and profitable channels. There is a reasonable and an unreasonable outcry against fiction. It is unreasonable to ignore the fact that the highest human intellect has selected imaginary narrative as its form of expression. If the literature of the imagination were blotted out, the brightest gems of genius would be extinguished. But if we cannot consent to sacrifice Cervantes, Le Sage, and Thackeray, we need not insist upon retaining in their company a host of creeping things, who have concocted highly spiced draughts of immoral poison for the consumption of our young men and maidens. The notion of a censorship is repugnant to all candid minds, and yet every town library must, in a fashion, wield such a power. The problem is, perhaps, more difficult in appearance than in reality, but in any

case it has to be solved, unless the free library is to become the willing purveyor of all the deleterious trash that morbid appetites may desire. The town library is not an instrument of amusement alone, but of education. Let this principle be steadily kept in view. There must be milk for babes, but the chief object is to provide meat for men. Pomeroy, the boy murderer, is said to have fed his young imagination upon "dime novels" of blood and murder. Whilst it is no business of a free library to provide such pernicious stuff for its customers, it would be worse than foolish to refuse the aid of Hawthorne and Thackeray, of Goldsmith and Dickens, in teaching the graces of the gentle life.

A useful adjunct to a free town library is a municipal art-gallery. It is beyond the power of any but the wealthiest communities to build up adequate collections of original works of art. The influence of good art can, however, be widely extended by means of true and honest copies. At a comparatively small cost, the greatest masterpieces of ancient and modern art can be obtained. An outline of the history of sculpture and of painting could be illustrated by facsimiles of characteristic specimens of each epoch. A village library with copies of Raphael's cartoons and the masterpieces of Michel Angelo will give a dignity and grace to the imagination of its frequenters.

The libraries of America do not, in any case, reach the magnitude of the famous collections of the Old World, but they are increasing at a rapid rate. They have a wider audience and more direct relations with the public at large. They are striving, and with considerable success, to carry onward and upward the work of the common school, and to diffuse the humanizing influences of literature among the great masses of the community.

WILLIAM E. A. AXON.

NOTE.

As stated in the commencement of this article, the chief authority on the subject is the report recently issued by the Education Bureau. This includes such varied and important matter that a statement of its contents has been added.

"Public Libraries in the United States of America, their History, Condition, and Management. Special Report, Department of the Interior, Bureau of Education." Washington.

1876. Part I, pp. xxxv. 1187. Contents. Letter of General John Eaton, the Commissioner of Education. Introduction by Samuel R. Warren and Major S. N. Clark, (the Editors). This includes The science of library arrangement, with a view to a common organization among libraries, and to the special study of library science in German Universities, by Dr. F. Rullamann, and a sketch of the Public Libraries of Mexico, by Fernando C. Willett; a notice of the Libraries of Brazil and of those of Japan, by Hon. David Murray, Ph.D. Chapter I. Public Libraries a hundred years ago, by Horace E. Scudder. II. School and Asylum Libraries, by the Editors. III. College Libraries, by the Editors. IV. Theological Libraries, by a Librarian and by Professor John S. Sumner, S.J. V. Law Libraries, by Stephen B. Griswold, LL.B. VI. Medical Libraries, by J. S. Billings. VII. Scientific Libraries, by Prof. Theodore Gill, M.D. VIII. Libraries in Prisons and Reformatories. IX. Professorships of Books and Readings, by F. B. Perkins and William Matthews, M.A. X. Libraries of the General Government, by the Editors. Library of Congress, by A. R. Spofford. Library of the Department of State, by T. F. Dwight. Naval Observatory, by Prof. J. H. Nourse. United States Naval Academy, by Prof. Thomas Karney. National Deaf-Mute College, by Prof. E. M. Gallaudet, Ph.D. Patent Office Library, by W. F. Taylor. Department of Agriculture, by J. B. Russell. Libraries of the American Seamen's Friend Society, by Rev. H. H. McFarland. XI. Copyright, Distribution, Exchange, and Duties, by the Editors. The Smithsonian system of Exchanges, by Prof. Theodore Gill. XII. State and Territorial Libraries, by Henry A. Homes, LL.D. XIII. Historical Societies, by H. A. Homes, W. I. Watkinson, and the Editors. XIV. Young Men's Mercantile Libraries, by F. B. Perkins. XV. Libraries of Young Men's Christian Associations, by Cephas Brainard. XVI. Free Libraries, by J. P. Quincy. XVII. Public Libraries in Manufacturing Communities, by William I. Fletcher. XVIII. Public Libraries and the Young, by William I. Fletcher. XIX. How to make Town Libraries Successful, by F. B. Perkins. XX. Reading in Popular Libraries, by Justin Winsor. XXI. Art Museums and their connection with Public Libraries, by Prof. H. S. Frieze, LL.D. XXII. Free Town Libraries, by the Editors. XXIII. Free Reading Rooms, by William C. Todd. XXIV. Library Buildings, by Justin Winsor. XXV. Organization and Manage-

ment of Public Libraries, by William F. Poole. XXVI. College Library Administration, by Prof. Otis H. Robinson. XXVII. Library Catalogues, by C. A. Cutter. XXVIII. Catalogues and Cataloguing, by Melvil Dewey, S. B. Noyes, J. Schwartz, and J. J. Bailey. XXIX. On Indexing Periodical and Miscellaneous Literature, by Prof. Otis H. Robinson. XXX. Binding and Preservation of Books, by A. R. Spofford. XXXI. Periodical Literature and Society Publications, by A. R. Spofford. XXXII. Works of Reference for Libraries, by A. R. Spofford. XXXIII. Library Memoranda, by Justin Winsor. XXXIV. Titles of Books, by Prof. Otis H. Robinson. XXXV. Book Indexes, by F. B. Perkins. XXXVI. Library Bibliography, by A. R. Spofford. XXXVII. Library Reports and Statistics, by the Editors. XXXVIII. Public Libraries in ten Principal Cities. Libraries of Baltimore, by G. L. Smith. Libraries of Boston and Vicinity, by F. B. Perkins. Social Law Library, by Francis Wales Vinson. Boston Athenæum, by C. A. Cutter. Mercantile Library Association, by L. Annie Baldwin. State Library of Massachusetts, by S. C. Jackson. New England Historic Genealogical Society, by John Ward Dean. Roxbury Athenæum, by Sarah E. Pitts. Congregational Library, by Rev. I. P. Langworthy. General Theological Library, by Rev. Luther Farnham. Public Libraries of Brooklyn, by S. B. Noyes. Libraries in Charleston and the Southern States, by Arthur Mazyck. Public Libraries of Chicago, by William F. Poole. Public Libraries of Cincinnati, by W. H. Venable. Public Libraries of New York City, by O. C. Gardiner. Public Libraries of Philadelphia, by Lloyd P. Smith. University of Pennsylvania, by Prof. R. E. Thompson. Public Libraries of St. Louis, by John Jay Bailey. Public Libraries of San Francisco and of the Pacific Coast, by A. E. Whitaker. XXXIX. General Statistics of all Public Libraries in the United States, by the Editors. Part II, pp. 89. Rules for a Printed Dictionary Catalogue, by Charles A. Cutter.

The "Library Journal." Official organ of the Library Associations of America and of the United Kingdom. Published monthly since September, 1876.

"A Classificaton and Subject Index, for Cataloguing and Arranging the Books and Pamphlets in a Library." By Melvil Dewey. Amherst, Massachusetts.

W. E. A. A.

THE PARIS UNIVERSAL EXHIBITION.

On May 1st, 1878, the Paris Universal Exhibition was opened by Marshal MacMahon, the President of the Republic, accompanied by a brilliant assemblage of distinguished visitors and officials.

This is the third great Universal Exhibition which has been held in Paris during the present century, the first having been held in 1855, in the Palais de l'Industrie, situated in the Champs Elysées, the main building of which still exists, and is used for Art and other Exhibitions; and the second in 1867, in the Champ de Mars; while that of which we intend now to treat was held on the same ground as the preceding one, with the addition of the large space on the opposite bank of the Seine known as the Trocadéro.

On this latter space was placed the permanent building destined eventually to be used for the fêtes of the Municipal Council of Paris, and consisting of a central rotunda containing a concert room 147 feet in diameter, flanked on each side by a semi-elliptical wing curving towards the Seine; in the galleries contained in these wings were exhibited the collections of Retrospective Art, and those illustrating the History of Labour.

From the centre of this building a magnificent cascade was formed descending the slope of the hill facing the Seine and the Champ de Mars, and losing itself in a vast basin, around which were grouped four spirited statues of animals. The space on each side of the cascade and between the basin and the north bank of the Seine was occupied by an ornamental park, in which were situated the fresh water aquarium and numerous independent buildings, such as the Algerian Exhibition, to which 2,000 exhibitors had sent specimens of the produce of the colony, the Persian Palace, Tunisian Bazaar, the Japanese Farm, and several minor objects of interest.

The palace and park of the Trocadéro were connected with those of the Champ de Mars by means of the Pont de Jéna, which was temporarily widened, and was treated during the whole of the year as being merely a means of communication between the different portions of the Exhibition grounds: a subway was made along each bank of the Seine for public convenience, in order that the inclusion of the bridge within the grounds should not entirely destroy ordinary traffic between places situated on the banks.

The Exhibition proper occupied the whole space of the Champ de Mars from the south bank of the Seine to the Ecole Militaire. This space was the same as that occupied by the Exhibition of 1867, but the total area covered, and the general form and plan of the buildings were very different. Thus, while the total area covered by the Exhibition of 1867 was only about 37 acres, that of 1878 covered no less than 140 acres.

In 1867 the principal building was in the form of an ellipse somewhat flattened at the sides, and all the galleries had to follow the same elliptical form, being cut at intervals by transverse passages converging towards a small central garden; this building was situated in the middle of an ornamental park in which were various buildings illustrative of the architecture and customs of different countries. In 1878, the general plan of the buildings was rectangular, and all the galleries—both longitudinal and transverse—cut each other at right angles.

Approaching the building from the Pont de Jéna, the quays on the bank of the river were occupied by sheds containing the apparatus for navigation and life saving, pumps and hydraulic apparatus, and a collection illustrating the principal exports and imports at all the chief seaports of France; behind these came conservatories and horticultural apparatus, and then came the approach to the Industrial Exhibition, through tastefully laid out ornamental grounds, about which were dotted numerous buildings containing special collections, and one or two restaurants.

After mounting a short flight of steps, a terrace, 918 feet long by 66 wide, preceded the principal façade of the building or rather buildings.

Looking at this façade one would have thought it was the entrance to one huge building, but it really only served the purposes of making an ornamental frontage, and of connecting together the three main buildings of which the "Palace of the Champ de Mars" consisted.

This palace was, in fact, divided into three great longitudinal sections, which were connected at each end by a transverse gallery or vestibule, the central section consisting of three separate buildings wherein were shown the Collections of Fine Arts and the Exhibition of the City of Paris, and each side section consisting of one large building, measuring 2,148 feet in length by 468 wide, which was again subdivided lengthwise into several galleries.

The section on the left (entering at the principal entrance in

the northern vestibule) was entirely devoted to the French exhibits, and that on the right to the exhibits of the various foreign countries. This division was moreover—with but a few exceptions—extended to the whole of the Exhibition buildings and grounds, so that a visitor standing on the south bank of the Seine with his back to the river, would find the buildings and exhibits on his left-hand were entirely French, while those on his right would belong to other nations.

A broad avenue on each side separated the Fine Arts Exhibitions from the Industrial Galleries, extending the whole length of the building; the avenue on the left was known as the "French Street," and that on the right as the "Street of all Nations," on account of its façade being divided into sections, which represented specimens of the domestic or other architecture of the various exhibiting countries.

The remainder of the space in the Champ de Mars was occupied by a long annexe on each side occupied by agricultural machinery, and by numerous other buildings devoted to the purposes of restaurants, offices, and many minor collections.

The principal entrance from the park to the Champ de Mars Palace was situated in the centre of the northern façade, and led directly into the Vestibule of Honour, a vast hall of iron and glass, measuring about 1,000 feet by 80, which served to unite the ends of the various longitudinal galleries; to the left on entering was the case containing the Crown diamonds of France, while to the right was a case containing some of the most valuable jewels and jewelled arms from the Prince of Wales's collection. These two cases stood as outpost sentinels marking the frontier line between two countries, for all the space in rear of the former case belonged to France, and that in rear of the latter to India and the British colonies.

The central and most conspicuous object in the space devoted to India was the large and handsome pavilion erected from the designs of Mr. C. Purdon Clarke, the ground-floor of which served as a huge show-case, a small central space being reserved for offices, while a staircase at each end led to an upper story in which were shown the carpets and rugs of Messrs. Vincent Robinson and Co., and a collection sent over by the Maharajah of Cashmere.

The Indian collection at this Exhibition differed in many respects from those sent to all previous Exhibitions; these collections were generally purchased in India at the Government

expense, and only supplemented to a small extent by the contributions of private exhibitors.

The most prominent objects in the present collection were the presents* made to His Royal Highness the Prince of Wales during his visit to India in 1874–75, which were arranged in numerous cases grouped around the central pavilion. Art Loan Collections were also contributed by the Queen, Lord Northbrook, Lady Emma Baring, Colonel Earle, and several others. The collections contributed by the Indian Government consisted principally of raw products—including a fine trophy of timbers from the Madras Forest Department—and of several minor collections of pottery and ornamental metal work.

Several importers of Indian goods contributed large collections; among these, Messrs. Vincent Robinson and Co.'s carpets and rugs were well worthy of inspection, being most tastefully laid out, and including—in addition to those of purely Indian manufacture—some specimens of Persian, Afghan, and Turcoman rugs of great beauty.

Messrs. J. Watson and Co., of London and Bombay, exhibited a good collection of gold and silver jewellery, and some metalware. G. Holme, of Bradford, showed a fine collection of carpets, brassware, shawls, and chuddas, including one of the latter which was manufactured expressly for the Exhibition, and was said to contain 97,400,200 mètres of handspun thread; the size of this chudda was four yards by two, and it weighed less than one pound. Carpets and Cashmere shawls were also exhibited by Watson and Bontor, and Farmer and Rogers, of London, and by several Paris firms of importers.

One other conspicuous object in this section must be noted, viz., the life-size equestrian statue of the Prince of Wales, by Mr. Boehm. This is destined to be erected in Bombay, being the gift of Sir A. Sassoon to that city. It should be mentioned that no special commission for India was appointed, but the whole of the arrangements for the section were carried out by the Royal British Commission.

For the first time Ceylon was represented in its proper position, *i.e.*, in close proximity to India, and by a somewhat larger collection than has been usually sent from that island to exhibitions. The most noticeable objects were some specimens of native jewellery, a collection showing the shell of the pearl oyster in

* A description of these presents appeared in the "Companion to the British Almanac" for the year 1877.

different stages of growth, and specimens of pearls and precious stones.

Our other colonies were all represented by collections of the natural products of the respective countries, Canada showing a trophy in the form of a huge octahedron of gold, containing 290 cubic feet, and representing the total bulk of gold raised in that country up to the year 1877, viz., 4,173,000 ozs. Other trophies also were distributed about the colonial space, such as the trophy of Canadian timbers, and those representing the bulk of gold, copper, and tin raised in our Australian colonies.

After inspecting the Indian and colonial exhibits in the Vestibule of Honour, the visitor would naturally pass into the main exhibition galleries, and commence his tour by inspecting the collection of English manufactures.

And here it may be remarked that England, not content with being one of the first to have her section ready—all the exhibits, with a few unimportant exceptions, being in their places on the opening day—was also the first to place her catalogues in the hands of the public, the official catalogue of the British manufactures being actually ready before the opening day. In addition to this catalogue, which was in two volumes, and contained the names of nearly 1,600 exhibitors, the British Commission also published a catalogue of the colonial exhibits, a guide-book to the Indian section in the form of a learned and exhaustive treatise by Dr. G. C. Birdwood on the history of Indian manufactures, and the sources whence most of the forms employed in Indian design were derived; and an illustrated catalogue by Mr. Blackburn, of the fine arts collection. And, in order that these catalogues should be more generally useful than such compilations usually are, they were all issued in two editions—English and French.

It need scarcely be said that England would not have been represented by so considerable a number of exhibitors, nor would she have distinguished herself by having her space and her catalogues ready at so early a date had it not been for two very conspicuous causes, viz., the prominent part taken in all matters concerning the British section by the President of the Royal Commission (H.R.H. the Prince of Wales), and the activity and energy shown by Mr. P. Cunliffe Owen, the secretary to the Commission, whose experience and friendly relations with the French Commisioners smoothed over or removed the many difficulties which were constantly occurring.

Perhaps a visitor who had carefully studied the previous Universal Exhibitions would have been more struck by the great progress in tasteful design made by our English furniture makers and upholsterers than by any other feature in the English section.

It is not many years since any one of only moderate means about to furnish his house in England would have found himself almost compelled to adopt the same forms of chairs and sofas and cabinets, and the same materials for upholstery as were to be seen in every other house around him—forms which, though calculated to wear well, were most unmistakably ugly; almost his only choice would have been as to the degree of excellence of the workmanship, in which the older and more expensive firms naturally excelled many of their younger brethren.

The collection exhibited in Paris, however, showed an almost endless variety of styles, while the forms were in most cases carefully designed by artists who have studied all the types of furniture existing in Europe, and the materials used were selected with the greatest judgment and good taste.

Most of the principal furniture exhibitors adopted the pleasing plan of showing a whole room or section of a room, with its appropriate furniture and decorations, thus enabling visitors to judge with greater accuracy of the effect of the whole style than if they only saw one or two pieces exhibited separately, the realistic effect of these exhibits being further heightened by the addition of such objects of ceramic ware, glass, or bronze, as were in each case suitable as ornaments to the style adopted.

Thus Messrs. Gillow distinguished themselves by the furniture and hangings of the Prince of Wales's Pavilion, in which was a dining-room of black inlaid walnut with tapestries representing scenes from the Merry Wives of Windsor, a morning room in rosewood, with Japanese panels of lac upon ivory, and bed-rooms in mahogany and satinwood, and in walnut and inlaid oak.

Messrs. Jackson and Graham supplied the furniture of the Queen Anne house built in the "Street of all Nations," and Messrs. Shoolbred that of the house built by Messrs. Doulton, in which was a small drawing-room in satin-wood with panelled silk walls, and a board-room of high class.

Messrs. Collinson and Lock, who have perhaps done more towards the introduction of good taste in furniture than almost any other firm, maintained their reputation by building and completely fitting and furnishing the country house in the style of

the seventeenth century in the "Street of all Nations," and by their exhibits in the main building, where their space was divided into four compartments, each illustrative of a different style of decoration.

Among special pieces of furniture, Messrs. Bertram and Son exhibited a beautifully carved chimney-piece and mirror-frame after Chippendale, and Harry Hems, of Exeter, showed a carved oak coffer, illustrative of the perpendicular style of English Gothic architecture; this was made from beams, upwards of 600 years old, which formerly were part of Salisbury Cathedral.

Many other exhibitors also contributed works which would be well worthy of mention did space permit.

Of almost equal importance with the furniture exhibits were those of glassware and of pottery, in both of which groups could be seen the great diffusion of good taste and the improved skill in manufacture which has been the result, in a great measure, of the opportunities of study and comparison afforded by exhibitions and by art museums.

In coloured glass some of our manufacturers can imitate—so closely as almost to defy detection—the far-famed wares of Venice. The most notable were perhaps Messrs. Powell and Co., of the Whitefriars Glassworks, and A. Jenkinson, of Edinburgh, for coloured and iridescent pieces and imitations of Venice, Murano, and other glasses; and the Aurora Glass Company for reproductions of ancient Egyptian, Phœnician, Roman, and Venetian art objects.

James Green and Nephew, and Daniell, of London, Jenkinson and Millar, of Edinburgh, and Thomas Webb, of Stourbridge, showed most excellent and dazzling collections of table and other glass, which were remarkable as much for the extreme elegance of forms shown (forms which in many cases were copied from the antique) as for the fineness of the cutting and engraving and the excellent quality of the material. The muslin or cobweb glasses of some of the Scotch exhibitors, and a service exhibited by Messrs. Webb, in which the designs (by Mr. O'Fallon) were all purely Celtic, were particularly to be noticed and admired.

Among exhibitors of pottery and porcelain, the Royal Worcester Works occupied, as usual, a very prominent place with their specimens of decorative objects in imitation of Japanese work, sets of ivory porcelain, and especially some green ware decorated with gold and bronze. A decided progress can be observed in these objects during these last few years, some specimens which

were shown at the Vienna Exhibition being likewise exhibited here for the sake of comparison.

Copeland and Sons showed charming pieces of Parian statuary and porcelain art productions; Minton, dinner and tea services, both plain and painted, pâte-sur-pâte porcelain, &c.; Wedgwood, a fac-simile of the Portland Vase and numerous vases in Greek and Renaissance styles; while Messrs. Howell and James contributed a collection of clocks and other decorative objects, with dials and panels of Faience, mostly painted by lady artists.

Messrs. Doulton exhibited a very fine collection of the ware which they have made a speciality, and which is distinguished by their name, including a very fine pair of vases more than three feet in height, and many objects treated with Persian and Indian decoration, though perhaps chief among the many attractive objects they exhibited were those decorated with Miss Barlow's life-like representations of animals, and Tinworth's *alto relievo* panels in terra cotta illustrative of scriptural scenes.

In the centre of Messrs. Doulton's space was shown a very large group in terra cotta, "The Football Players," which was exquisitely modelled, and, taking into consideration the difficulties attending the baking of a large group containing so many figures, must be deemed a triumph of the ceramic art.

In other groups also England was well represented; thus Messrs. Elkington had a truly magnificent show of their celebrated electro-plated ware, including many highly finished works of art and many reproductions of pieces of ancient metal work in the South Kensington Museum. They also showed some enamels (both Cloisonné and Champ Levé) executed by them after old Japanese and Chinese processes, which are stated to have been lost sight of for years and re-found by them.

Hart, Son, and Peard had a case containing a good show of church plate, candelabra, épergnes, &c., including one richly wrought épergne, which was composed of more than 2,000 pieces of metal, mostly soldered together, some electro-gilt and some oxidised, with ivory carved subjects and enamelled shields. This was made for the Manchester City Plate Competition.

In jewellery English firms were but slightly represented, and the most noticeable exhibits were those of Scotch and Irish manufacturers; among the former may be mentioned Mackay, Cunningham, and Co., and Aitchison, of Edinburgh, both of which houses showed large collections of Scotch pebble jewellery, the former showing, also, a handsome dessert service, in oxidised

silver, designed by Sir Noel Paton, R.S.A., decorated with representations of scenes from the "Tempest." Among Irish exhibitors, W. Gibson, of Belfast, and Jeremiah Goggin, of Dublin, contributed good specimens of bog oak jewellery, and reproductions of ornaments of Celtic forms.

The mere enumeration of the principal exhibits, in all the other groups, would occupy a space far greater than the limits of the present paper; it must, therefore, suffice to say that England was not behindhand in any of those classes of manufactures for which she has always been celebrated, while in machinery and agricultural implements she was exceptionally well represented.

Next to England came Canada and Australia; the principal exhibits from Canada were sewing-machines, skates, cloth, furs, some fine photographs of scenery, and a model of one of the locks connecting the Canadian lakes; these fine locks are capable of admitting vessels drawing 14 feet of water, and measure 270 feet in length by 45 in breadth.

In the Australian section, the natural wealth of the country was shown by interesting collections of ores and metals, notably a very good one by the Sydney Department of Mines, while numerous exhibits of wool, wines, preserved meats, biscuits, &c., showed that Australia is something more than a mining country.

Among manufactures may be mentioned the silversmith's work of H. Steiner and of J. M. Wendt, of Adelaide, in South Australia, who exhibited fine specimens of emu eggs, mounted in frosted silver, as cups, table ornaments, inkstands, &c., the rich deep green of the eggshell contrasting excellently with the frosted silver, while the subjects chosen for the silver decoration were appropriate and tasteful, generally consisting of groups of foliage with figures of native Australians, emus, kangaroos, &c.

The American section, which came next to the English colonies, was one of the first to be ready, and contained a good collection of the best American manufactures; the trophies of tools, such as axes from Boston, saws from Philadelphia, agricultural tools, and Hooper and Townsend's collection of bolts and nuts, of all possible dimensions, as also some leather driving-belts for machinery, of huge size, exhibited by Jewell and Sons, of Hartford, were sure to attract attention.

The Americans sustained their reputation for the manufacture of surgical, and especially dental, instruments and appliances, by the exhibition of a large collection, embracing all kinds of in-

struments and some most ingenious mechanical chairs and beds for operations.

Tiffany and Co., of New York, showed the progress of the silversmith's art in America, by exhibiting some handsome silver plate and many specimens of inlaid, repoussé, and oxidised work.

One of the most important exhibits was that of the Waltham Watch Manufacturing Company, whose wares have, within the last few years, established for themselves an almost universal reputation. The fact that all the parts of these watches are made by machinery and are interchangeable, effects a great saving in the cost of production and of subsequent repairs, while they can be turned out at so great a rate that it is stated that 3,000 watches per week can be manufactured by this Company; it is also stated that the Company can and does compete successfully with the great Swiss watchmaking centres.

Some of the American photographs were particularly remarkable, no less on account of their large size than of their great clearness and beauty of tone; a set of photographs by J. Landy, of Cincinnati, Ohio, representing Shakespeare's Seven Ages of Man, was especially worthy of notice.

Norway and Sweden occupied the space next to the United States of America. As might be expected, furs and skins filled a very prominent place here, several handsome trophies showing furs of all kinds, both in the natural state and made up into coats, rugs, gloves, &c. The mineral wealth of Sweden was well shown by a collective exhibition of the produce of several mining districts, and by trophies of iron bars, steel rails and wheel-tires, armour plates of Bessemer steel, and specimens of copper and lead, both manufuctured and in the form of pigs.

Some of the Norwegian wood carvings equal those of Switzerland in grace and finish; a case of boxes, &c., carved by Ole Olsen Moene (a peasant of Ópdal) was especially worthy of notice.

The University of Christiania sent a very good collection of the national silver jewellery worn by the Norwegian peasants, while Theodor Olsen, of Bergen, and P. A. Lie, of Christiania, showed many excellent specimens of the silver filigree jewellery which is so well made in Norway.

Another noticeable exhibit was an apparatus for communicating from a signal station with the driver of a railway train, at any point of its course, by means of telegraphic wires, contact being made between the wires and the apparatus on the engine by

means of wire brushes fixed at intervals to overhead frames; it is possible, with such an apparatus, to have an exact record of the position of every train on the line, and collisions should thus become almost impossible.

Some useful applications of wood-paste, produced by crushing and grinding fragments of deal, were shown in this section; this paste is rolled into sheets and covered with paper or leather, and then used for hanging in rooms, in place of wall paper or tapestry; it is said to have the advantage of absorbing moisture, and thus to keep the room dry; the same paste is also largely used for making paper.

Italy came next in order to Sweden and Norway. The first objects to catch the eye of the visitor here were the dazzling collections of glass, of all hues and forms, exhibited by Signor Salviati, of Venice, and by the Venice and Murano Mosaic Glass Company.

The art of producing the beautifully coloured and enamelled glasses, for which the Venetians were famed in the middle ages, had become almost extinct until it was revived, not many years ago, by Signor Salviati and some other gentlemen; the collections here exhibited were a proof that their efforts have been crowned with complete success. Their work, however, is not confined solely to producing objects in the Veneto-Byzantine style, but they exhibited capital reproductions of all the best antique glasses and vases found in the ruins of Pompeii, including specimens of the famous murrhine cups of the ancient Romans.

Next to the glass, the Venetian, Florentine, and Roman mosaics were likely to attract attention; they were of all sizes, from large framed views of Rome and Venice, and life-like pictures—one being a representation of a combat in the arena between two knights on horseback—down to the tiniest representations of birds and flowers, intended for setting in ear-rings, studs, or rings.

In jewellery, Castellani's reproductions from the antique, and specimens of Italian peasant jewellery, formed a most interesting collection, while the ordinary branches of Italian jewellery, such as mosaics, cameos, coral, and filigree, were well represented.

The School of Burano (a small island to the north-east of Venice), founded in 1872 for the purpose of resuscitating the manufacture of Venetian point lace, appears to be doing its best to revive the taste for this once celebrated lace; the school exhibited some fine specimens of its work, the principal piece

having employed fifteen workwomen for two years, and being a reproduction of a vestment which belonged to Pope Clement XIII, who was born at Venice in 1693; the original vestment is now the property of the Queen of Italy.

In the Educational Section was shown an excellent relief model of the portion of the Alps between Susa and Savoy; the work was executed in what was aptly called the "natural style," care being taken to imitate the geological formation and the natural colouring of every portion of the mountains, so that, on looking through magnifying glasses attached to the frame for the purpose, it was easy to imagine one's self looking at the actual mountains.

Japan exhibited a larger collection than has been seen in any previous European Exhibition; the quality of the goods exhibited was in most cases excellent, but the prices charged were, in some instances, exorbitant; the Japanese tradesmen, finding their manufactures appreciated in Europe, are apparently determined to "make hay while the sun shines." The collection comprised a great variety of porcelain vases, both of the well-known white and blue colours, and also of the less known wares with brown, black, and gold grounds, many of those with black and brown grounds being ornamented with gold, so as to have the exact appearance of bronze inlaid with gold.

In their combinations of different metals for purposes of ornament, the Japanese are particularly happy, and the collection of bronzes ornamented with inlayings and relief figures, in silver and silver gilt, and of iron vases with Niello ornamentation, was such as to delight the eyes of collectors.

Cabinets and other articles of wood, lacquered in all different styles, and of ivory incrusted with relief subjects in silver, gold, and mother-of-pearl, were there in profusion, while textile fabrics were represented by silks and satins, many of them richly embroidered with the well-known quaint representations of men, birds, and trees.

China, also, sent a very large and interesting collection; the carvings especially showed the extreme patience and ingenuity of the Chinese workmen; screens of all sizes were so carved and fretted as to resemble lace rather than wood, while pieces of furniture of all kinds were ornamented, some with fretwork and some in high relief, and, in many cases, were further decorated by painting in brilliant colours and gilding; the carving on some of the pieces being carried to such an extent that scarcely a

square inch of the original surface of the wood could be seen; the carvings in ivory and inlayings in ivory and mother-of-pearl were also very remarkable.

Rich embroideries in gold, silver, and coloured silks on cloth silk, or satin, and fans with paintings on feathers, silk, or rice-paper, and with the *brins* and *panaches* (whether of ivory, mother-of-pearl, or wood) covered with minute carvings of the greatest delicacy and finish abounded, while of porcelain, both ancient and modern, and of enamels, there was such a collection as has seldom, if ever, previously been brought to Europe.

In the Spanish section the Ministry of War exhibited an interesting collection, showing the equipments and war-materials used by the Spanish Army, including a set of lay-figures dressed in the various uniforms worn.

Zuloago, of Eibar, in the province of Guipuzcoa, as usual sent a charming collection of caskets, picture frames, vases, and arms of the steel damascened with gold and silver, which he has made a speciality, and also a magnificent pair of vases, about three feet six inches in height, of somewhat similar work: other exhibitors showed smaller specimens of the same class of work. There was a good collection of pottery in this section, including some pieces which were remarkable for simplicity and purity of form; the forms employed were, in most cases, of Arab origin.

Spain also contributed a very interesting collection of national costumes, and the class for textile fabrics was well filled with cloth and printed cotton goods of all kinds. France supplies Spain with most of her fans, but some of those exhibited here showed that the manufacture is not utterly neglected in Spain itself, and were worthy of the country where a fan is an absolutely indispensable article of the female toilette; especially may be mentioned some fans of black and white lace, the mounts painted with charming groups of figures, and the *brins* and *panaches* of mother-of-pearl inlaid with gold and silver.

Austria-Hungary occupied the next space, the most brilliant and attractive feature in their section being the magnificent show of glass: Lobmeyr of Vienna, Ullrich of Wilhelmsthal, Moser of Carlsbad, and many other exhibitors combined together and produced two courts, which were well calculated to dazzle the spectator by the brilliancy of the objects shown therein; the rage for iridescent glass, which has lately prevailed, has had its effect even on the Bohemian glass, for here were glasses showing all the tints of the rainbow; in addition,

there were tankards and vases of ruby, green, opal, and all the other tints glass is made to assume, and ornamented with enamel painting and with gilding and engraving; some of these were excellent in colour and design, but many were more dazzling than beautiful.

Messrs. Goldschmidt, of Dubnik, showed a magnificent collection of the opals for which Hungary is famous; among others, what are stated to be the largest white and black opals ever found—the former weighing uncut, 609 carats, and the latter being set with diamonds and weighing 250 carats since cutting. Of other jewellery there was nothing very remarkable; there was, however, an ample collection of the well-known silver filigree set with turquoise and garnets and ornamented with enamel.

Some fine specimens of swords and daggers, with richly ornamented and jewelled scabbards and hilts, as also some of the rich costumes of velvet, trimmed with fur, and with enamelled belts and buttons, which are worn by the Hungarian nobility, were exhibited in this section; the Majolica and enamelled Faïence were also very good, having graceful forms and soft and harmonious colouring.

Vienna being especially noted for the manufacture of fancy articles and leather work, there was, of course, a very large and varied show of these goods, including caskets, writing-table sets, travelling-bags, purses, cigar-cases, clocks, candlesticks, &c., in the construction of which metal and leather were principally used, the metal work being gilt, silvered, bronzed, or blackened, and the leather either plain or decorated with paintings or with ornaments in stamped metal. Another of the great branches of Viennese manufacture—that of meerschaum and amber pipes and cigar-holders—was also well represented, but it would be impossible, in the present space, to describe half of the fanciful and ingenious carvings which the artists who work in these materials introduce into their work.

One of the glories of the Austrian Section was the magnificent collection of tapestries, carpets, table-covers, and rich decorative hangings exhibited by Philip Haas & Son, of Vienna. This firm is constantly striving to produce some new and gorgeous fabric, and their imitations of Indian kincobs and other woven substances, into which gold and silver thread are introduced, are excellent, though their high price must naturally place them beyond the reach of any but the very wealthy.

A class of Austrian work, which has of late years been largely introduced into England, is the bent-wood furniture; Messrs. Thonet exhibited a large collection of furniture all made on their system of bending wood to any required form: as an instance of what can be done in this way, they exhibited a piece of ash, thirty-one feet in length and three inches square, which had been rolled up into a perfect spiral, the extreme diameter of the spiral not exceeding three feet.

In the Russian section, Siberia occupied a prominent position with its specimens of malachite, lapis-lazuli, porphyry, and jasper, all of which are employed largely for the manufacture of vases, chimney-pieces, clocks, and smaller ornaments, such as paper-weights, &c., of which many fine specimens were shown; one monster block of malachite was exhibited which weighed more than one ton.

But the public were more likely to be pleased by the collection of goldsmiths' and silversmiths' work, which showed remarkably good taste: the Moscow silversmiths are celebrated for their elegant productions in silver and gold, sometimes ornamented with enamel or Niello, and sometimes frosted—the most pleasing forms and ornaments being generally of Byzantine character: the cases of Messrs. Tasikoff and of Messrs. Ovitschinikoff, of Moscow, contained some excellent examples of all these kinds of work.

The Russian national costumes, the embroideries and handsomely ornamented and jewelled arms from the Caucasus, and a case containing small wares, such as cigar-cases, boxes, purses, &c., of papier-mâché, ornamented with scenes from Russian life, painted in bright colours and varnished, were all objects of interest in this section.

Switzerland came next to Russia, and, as might have been expected, the Swiss collection of watches yielded to none in excellence: a large court was devoted entirely to the specimens of skill in this important manufacture, commencing with samples of watchmakers' tools, lathes, &c., mostly from Couvet and Cortaillod, and remarkable both for their excellence and cheapness, continuing with collections showing the work done in successive years of the course of instruction by the pupils of the horological schools, and finishing with specimens of parts of watches and of completed watches of all descriptions from the simplest and most inexpensive to the most complicated and most highly ornamented. Among curious specimens of work-

manship in this class may be mentioned a small watch, by Messrs. Badollet of Geneva, which was smaller than a three-penny piece; this was suspended from the mouth of a tortoise in gold and brilliants, and the whole was mounted as a breast-pin.

Messrs. Golay-Leresche and Sons, of Geneva, exhibited an ingenious piece of workmanship in the form of a silver casket about 8 inches in height, in the front of which were shown a marine chronometer, a perpetual calendar, an aneroid barometer and thermometer, separate dials showing also the day of the week and month. On the top of the casket were mechanical figures of a shepherd, a bird, and a cat which went through a little performance every hour. The casket was further ornamented with paintings in enamel.

Another court was devoted entirely to the muslins and embroideries of St. Gall and Appenzell, which were tastefully arranged round the walls and in central cases. A very complete collective exhibition of the silk industries of Zurich, and collections of enamelled pottery from Heimberg, and of the well-known carved wood ornaments, were the remaining principal features of the Swiss collection. In the machinery gallery much interest was excited by the small locomotive engine of the pattern used on the Rigi Railway; these engines ascend inclines of one in four, working by means of a rack and pinion movement laid down in the centre of the line.

From Belgium the most noticeable exhibits were the tapestries from Malines and Ingelmünster, some huge specimens of plate-glass and mirrors from the manufactory of Ste. Marie d'Oignies in Brussels, chandeliers and bronzes, carved furniture, and a large collection of fire-arms of all kinds—both military and sporting—exhibited by several Liège firms. Some of the specimens of Spa work, or painting of flowers and animals on light wood, highly varnished, were pleasing; and in the machinery gallery was a fine collection of machines, notably those from Messrs. Cockerill's works at Seraing, and of railway rolling-stock; one novel form of railway carriage, consisting of first and second class compartments, luggage van, and engine, all in one, would be very useful on small lines where it is not advisable to run heavy trains.

Greece contributed a small collection—mainly of raw products; a collection of specimens of timbers, by Professor Orphanides, might serve as a model for all such collections; each

specimen was so cut as to show three different sections, and was surmounted by a framed and glazed label containing the name and a well-dried specimen of the leaves and flower of the tree.

Denmark occupied but a small space, but sent some good samples of her manufactures. The Scandinavian gold and silver jewellery and the reproductions in terra-cotta of Etruscan, Greek and other vases in miniature, made at Copenhagen, are beginning to be well known and are justly admired; in both these classes there was a good show. Here were also some good and cheap imitations of stamped leather in painted linen backed with paper; they were intended principally for use instead of wall-papers or hangings.

The space beyond Denmark was divided between the Central American Republic and several smaller States, viz., Luxembourg, Monaco, Persia, Siam, Annam, Tunis and Morocco, all of which sent collections of more or less interest and magnitude.

Portugal utilised the three courts into which her section was divided not only for showing the produce of the country, but also for giving some illustrations of Portuguese mediæval architecture. Thus the Portuguese façade in the "Street of all Nations" was a reproduction of a part of the monastery of Belem, and the first of the three courts was made up of reproductions of other portions of the same monastery, all carefully executed from photographs, while in the other courts were shown many photographs and sketches of the Dominican convent at Batalha, and of other interesting architectural monuments.

Wines, tobacco, snuff, and manufactured cork were shown in plenty and gave evidence that there was no falling off in the supply of these staple products, while among the most striking of the more ornamented goods may be mentioned a collection of life-like and artistic clay figures dressed in the various costumes of the country, and some extremely tasteful work in silver filigree.

Holland and the Dutch East Indies occupied the extreme end of the foreign portion of the Exhibition; these collections were less remarkable from an artistic than from a commercial point of view. There were, indeed, but few art manufactures exhibited, but there were trophies of liqueurs, of stearine, and of Indian forest produce, and samples of tea, coffee, sugar, vanilla and cereals from Java; the Ministry of Public Works exhibited some excellent sketches, plans and models of most of the important public works recently executed in Holland, such as

harbours, dykes, dams, and piers, while dressed lay figures, and one or two interiors of Dutch rooms, gave some idea of the manners and costumes of the people. M. Ernest van den Broek d'Obrenan's very complete and interesting ethnographical collection from the Dutch East Indies must also be mentioned.

As previously stated, one half of the total area of the Exhibition was devoted to the French exhibits, it is therefore manifestly impossible to give here more than the slightest outline of the manner in which this vast space was filled, for the mere mention of the principal exhibits in each group would alone occupy more than the whole space available for this paper.

The great area allotted to France enabled the proper classification of the goods to be adhered to with tolerable strictness, and the absence of the transverse barriers which were necessary to separate one country from another rendered the studying of the exhibits in any one group a much easier and less fatiguing task in the French than in the foreign sections.

According to the plan laid down for the arrangement of exhibits, the building was divided longitudinally into five galleries or aisles, exclusive of the central buildings, which were devoted to the fine arts.

These galleries were allotted as follows, starting from the centre :—

1st Gallery.—The liberal arts : *e.g.*, appliances for education, stationery, musical and philosophical instruments, medicine, &c.

2nd Gallery.—Furniture and accessories.

3rd Gallery.—Textile fabrics, clothing and accessories.

4th Gallery.—Mining industries, raw and manufactured products.

5th Gallery.—Apparatus and processes used in the mechanical manufactures ; alimentary products.

The remaining groups, viz., agriculture, pisciculture, and horticulture were accommodated in annexes, and in various outbuildings dotted about the grounds.

Where this plan was closely adhered to it was a comparatively easy matter to study and compare the products exhibited in any one group, but in the foreign section limited space and the divisions between the various countries made some departure from the programme necessary in many cases.

On commencing a tour through the French section by starting from the Vestibule of Honour, the visitor was first attracted by the case containing the Crown diamonds of France, a case the

contents of which it was difficult to examine closely as the admiring crowds were always kept at a respectful distance; at night this case was lowered into an iron safe constructed underground.

A large pavilion in the Greek style occupied the next post of honour; it was occupied by the manufactures of Sèvres and by the Gobelins and Beauvais tapestries, including eight panels designed by Mazerolles and destined for the ornamentation of the refreshment room at the Opera, and several tapestry copies of paintings by celebrated artists.

A colossal statue of Charlemagne, surmounting a trophy composed of smaller statues, busts and other specimens of metal casting exhibited by Messrs. Thiebaut, filled the greater part of the remaining space in the vestibule.

In the gallery devoted to the liberal arts the first portion was occupied by the exhibits of the Ministry of Public Instruction, commencing with collections which were the result of various scientific missions organised by the Ministry and which included several reproductions executed from casts, such as a Peruvian gateway, and a very curious ancient Peruvian monolithic fountain, covered with bas-reliefs of lizards and various strange animals, the original of which was discovered by M. Wiener, at Concacha.

The same department exhibited a very interesting and very complete collection illustrating the whole of the apparatus used for instruction in the various primary and secondary schools together with specimens of work executed by pupils: this collection was followed by numerous others, all bearing on the subject of education.

Of specimens of printing and bookbinding there was a large collection, especially of those handsomely illustrated and well-bound works for the production of which Parisian publishers such as Didot, Hachette, and others are famous.

Philosophical and surgical instruments and appliances, and chemical and photographic apparatus were all well represented, while at the end of the gallery were the musical instruments, including some ingenious mechanical pianos and harmoniums.

In the gallery devoted to furniture and its accessories, the first portion was occupied by bronzes and art castings, of which there was a truly magnificent collection; where so many were excellent it is difficult to select only one for mention, but Messrs. Barbedienne seem indeed to have brought the art of casting to perfection, as was evidenced by a small case of objects

which would almost escape general notice among the larger objects exhibited; in this case were bronze castings made in moulds taken from living shell-fish and beetles of different species, the castings being so perfectly and delicately made as to make it difficult to believe they were not the result of some galvanoplastic process. Of larger works the same firm exhibited many examples, including a magnificent clock in the Renaissance style made expressly for the Exhibition and suitable for a palace or a museum; the materials used were gilt bronze, Greek red marble and Limoges enamels, and in its manufacture 100 people were employed for more than two years.

The bronze statue of Louis XIII at the age of fifteen, cast by the same firm from the model by Rude, was a marvel of workmanship, every stitch in the collar being as distinct as though it were really of lace instead of metal.

After the bronzes came the furniture and the many other groups which were included among its accessories, such as decorator's work, paper-hangings, glass, pottery, cutlery, silversmith's work, clocks and watches, fancy articles, &c.

Of furniture proper the show was, on the whole, not so striking as that in the English section, but the good taste of the French in choosing suitable hangings and materials for covering furniture was everywhere apparent.

Fourdinois exhibited some doors, tables, and chairs in the Renaissance style, of excellent design and workmanship, as also a beautiful cabinet or coffer of inlaid woods, with silver frieze and borders, having a cornice supported by four graceful winged figures of ivory, standing on lapis-lazuli columns.

Messrs. A. Giroux exhibited a novelty which they applied both to articles of furniture and to fancy articles, such as caskets, trays, desks, &c. They described the work as Cloisonné ivory. The article to be ornamented is made of wood, and an outline of the intended design affixed to the surface in raised gilt wire; the various compartments are then filled in with pieces of ivory and coloured woods, just as the compartments of a piece of Cloisonné enamel are filled in with enamel. The surface is sometimes further ornamented by the addition of raised metal figures of birds, &c., in Japanese style.

A bath-room and lavatory decorated with encaustic tiles, by Collinot, in the Persian style, had a very pleasing effect; it was early purchased for the Vienna Museum.

In pottery and glass Cellière's artistic pottery in exact imita-

tion of Japanese bronzes and Indian Bidri-ware was exceedingly curious and well executed. Saint-Gobain exhibited a marvel in the shape of a huge sheet of plate glass measuring 21 feet by 14; while the Baccarat Company maintained their *prestige* by a dazzling court with a central crystal pavilion in the form of a Greek temple, enshrining a statue of Mercury. All around were shown other specimens of their cutting and engraving, as well as imitations of Venetian and Bohemian glass.

No one could pass without admiration the delightful little terra cotta groups from Boulogne and Dieppe; they represented, for the most part, groups of fishermen and their wives and children and were executed with the utmost delicacy and truth to nature.

The Besançon watchmakers exhibited a very interesting collection, and supplied statistics proving how important this industry has become to the department of the Doubs. It appears that a great increase has taken place in the manufacture of watches in Besançon and its neighbourhood during the last ten years; in 1866 the total number which paid duty was 305,435, while in 1876 the number was 455,968. During the same period it is stated that a considerable increase has also taken place in the number of watch movements which are exported from Besançon to Switzerland and there finished and sold as Swiss watches.

The remainder of the gallery was occupied by the classes of gold and silver plate, cutlery, perfumery, &c., and thus conducted the visitor to the southern vestibule, which was equal in size to the Vestibule of Honour, and was devoted to various processes of manufacture, such as diamond-cutting, lace-making, artificial flower-making, glass-engraving, glass-spinning, metal-stamping, and to the sale of the cheap articles manufactured on the spot.

The gallery for clothing commenced with the apparently somewhat misplaced collection of fire-arms of all kinds, whether for military or sporting use; from these the visitor passed to the textile fabrics of linen, cotton, silk, and wool, which were shown in all stages from that of simple thread to the richest silks and velvets of Lyons; then followed the laces and embroideries of Bayeux, Caen, Chantilly, and Mirecourt, and this exhibition of piece goods of all descriptions was most appropriately concluded by an equally complete one of made garments and costumes of all descriptions, and of articles other than clothing worn on the person.

Chief among these latter may be considered jewellery, of which there was a very extensive display, one court being devoted to

cheap jewellery, and to those excellent imitations of precious stones for which Paris is so famous, while another contained real gems and specimens of artistic work of the highest excellence. The charming combinations of gems with gold or enamels shown in this court seemed almost endless, and would need pages of description to do justice to them. Among expensive and uncommon pieces of jewellery may be mentioned a brooch with two pendants, exhibited by Messrs. Rouvenat, and valued at 100,000*l.* The brooch consisted of a huge blue sapphire set with diamonds, and the pendants were of similar stones of a smaller size.

At the extreme end of this gallery was a very attractive class—that for toys. Toys of Parisian manufacture are probably the most tasteful and ingenious in the world, and the collection here exhibited certainly maintained their reputation. There seemed no end to the clever mechanical toys, such as swimming dolls, walking animals of all kinds, ironclads, and locomotive engines, with complete railways; there were doll's garden-parties, weddings, and dolls' houses, in which all the furniture was made accurately to scale. To look at them was to imagine one's self among the Lilliputians, and made many grown-up people wish they were children again to possess and enjoy such charming toys. The dolls themselves were so perfectly dressed as to seem less like toys than models of the fashions, and indeed, before the introduction of journals of fashions the Parisian dolls used to serve this purpose, being frequently forwarded to different countries to show the latest modes.

In the next gallery were to be seen the collections of produce—both raw and manufactured—of mining industries and forestry, with illustrations of the manifold uses to which both metals and timbers are put; products of hunting and fishing, feathers, furs, leather and skins, chemical products, and dyes.

The number of machines exhibited by France in the machinery gallery was smaller than at the Paris Exhibition of 1867; nevertheless, it would need a volume to describe the contents of this gigantic workshop, which measured 2,148 feet in length, 117 in breadth, and 78 in height, and was furnished with central overhead shafts and pulleys throughout its entire length, from which the various machines on either side were driven.

The more interesting of these machines constantly attracted crowds of spectators, this being more especially the case with those machines in which the results of the work were at once visible, such as the type-composing and distributing machines, printing

presses, endless band saws, and the cold air ice-making machine, in which blocks of ice were made by the agency of the great dimunition in temperature caused by the expansion of air which had been previously compressed.

In the Fine Arts Gallery, so far as was possible, the space allotted to the various foreign countries was in a line, or nearly so, with their respective sections in the industrial galleries. For France, however, this arrangement was impossible, and the French Fine Arts collection—which included many first-rate works—occupied a central position, and was divided into two portions by the Pavilion of the City of Paris. This pavilion was occupied by models and plans of architectural improvements recently executed in Paris, models of sewers and of the apparatus used in cleansing them, fire engines and apparatus, models of schools, and the very interesting collection exhibited by the Department of Public Assistance, showing models of hospitals, appliances used for the relief of cases of accident, and improvements in the apparatus used in the treatment of lunatics; the pavilion also contained a selection of works of art, bought at different periods by the city of Paris, for the purpose of ornamenting various public buildings.

England contributed a larger collection of works of art than any other country, except France, mainly owing to the liberality with which various amateurs and collectors—to the number of 233—placed their collections at the disposal of the Royal Commission. The exhibits included many well-known paintings, which attracted their crowds of admirers, and the studying of the collection was much facilitated, by the careful labelling of every picture, with its title in French and the name of the artist, and also by the publication of a descriptive catalogue, giving sketches of many of the more remarkable pictures.

Of the art collections exhibited by other nations, those of Russia, Austria, Hungary, Belgium, and Italy were, perhaps, the most important, while Germany—though she had declined to contribute to the Exhibition—was, at the last moment, persuaded to alter her decision to the extent of sending an admirable collection of paintings and of books with artistic illustrations. Small collections were also exhibited by most of the other countries.

Among the numerous buildings which surrounded the main Exhibition galleries were the annexes, containing the collections of agricultural implements and railway materials, boiler-houses,

wine-tasting pavilions, horticultural works and restaurants; of these latter there were three classes, viz., 1st. The more expensive, where meals could only be obtained *à la carte;* 2nd. Those where meals could be obtained for a moderate sum, *à prix fixe;* and, 3rd. The cheap establishments of Duval and Gangloff, where meals could be obtained at a very reasonable price. There were also several refreshment bars in different parts of the building and grounds.

Among the many other buildings in the grounds may be mentioned that devoted to the Government tobacco manufactory, in which all the operations of preparing tobacco and snuff might be witnessed; the pavilion of the Public Works Department, in which were plans and models of the principal works executed by the department—such as harbours, canals, lighthouses, bridges, &c.—and excellent collections of the mineral products of France, together with a good geological map of the country; and Messrs. Schneider and Company's special exhibition, illustrating their gigantic establishment and works at Le Creusot, which give employment to 15,250 workmen; the exhibits comprising sketches, plans, and models of parts of the works and of tools and machines employed; samples of the coal and iron produced from the Company's mines; and specimens of their manufactures in iron and steel, such as locomotives, marine engines, steel tubes for cannon, armour plates, and an 80-ton steam hammer, which was erected outside the building, and served as a triumphal arch in front of the entrance.

The present space does not allow of any further description of this huge World's Fair; both as regards size and as regards the magnitude and importance of the collections displayed, it was the most remarkable Exhibition that has hitherto been held; it was also remarkable as showing how quickly France has recovered from the disastrous effects of the war in 1870–71, and as having been erected and opened during a period of such political disturbance for Europe generally that, up to a very few weeks before the opening, rumours were circulating that it would not be held at all.

It cannot be doubted that, before long, new inventions and improved processes will be the results of the opportunities of study and comparison it has afforded to all classes.

J. R. Royle.

ELECTRIC LIGHTING.

SCIENTIFIC investigators have for many years regarded electricity as a possible agent for obtaining light in large quantities. It has already become one of the most useful sources of illumination, and, judging from the recent rapidity of its development, it promises shortly to do very much more. As a source of artificial light, it is one of the most important instances of the application of science to the arts. Now that it has become so thoroughly developed as regards effectiveness, the ease with which it can be managed, and expense of maintenance, it surpasses ordinary coal gas for very many purposes.

On the other hand, although it has in some cases competed with coal gas successfully, there can be little doubt that there are two distinct fields for these two methods of illumination. M. Fontaine states that "The electric light has its place marked out for it under many circumstances; but far from diminishing the consumption of the other lights, it will lead to their further development by demonstrating the advantages of a more powerful and more complete illumination." But who can say how soon electricity may supersede all other sources of light, for whatever purposes they may be applied? The methods of producing it were formerly such that it could not be economically employed; in fact, it was held by some scientific men that *no* method of electric lighting could be economical, because in the case of gas raw material was obtained and converted by very simple means, whereas in the case of electricity, where batteries were employed, manufactured material (zinc) was consumed. This was, of course, before the introduction of *magneto*- and *dynamo*-electric machines.

The purposes for which electricity does supersede gas and oil, are—for lighthouses, for the lighting of large yards and open spaces with powerful light at a few centres, for the illumination of silk and other manufactories where it is important to be able to distinguish colours by night, in dye-works, picture galleries, for scene-painting, room decorating, &c. For fortifications, ships of war, and for torpedo warfare it is of the utmost importance, also for campaigning. Most of the Governments are now supplying their armies and navies with electric light apparatus.

The light is of the same colour as that from the sun itself, so that working by electric light is the same as working by daylight. In weaving sheds the darkest colours can be worked. The most

delicate colours do not change under it, they can be assorted, and looms fed just as easily as by day. The delicate *shades* of blue and green can be distinguished by it, whereas with gas it is sometimes difficult to distinguish blue from green.

Its intensity is such that it enables contractors and others to carry on work which is spread over large areas by night. The firm of Head, Wrightson, and Co., of Stockton-on-Tees, in the winter of 1876, employed a Siemens' electric light machine and lamp to light up a large open space used as a bridge building yard. This was one of the first applications of electricity to the lighting up of workshops in England. Mr. T. Wrightson observes that "the convenience of this lighting arrangement was of a value beyond the consideration of cost; but his firm considered that interest on the outlay, superintendence by one man, and cost of charcoal points was amply covered by the small charge of one shilling per hour." There are many other instances of workshop-lighting now, as many hundreds of these apparatus are in use all over the world.

The electric light cannot be practically subdivided so easily as gas can at present, and therefore is not so well adapted as its rival for the illumination of private dwellings and streets; but MM. Jablochkoff and Werdermann have partially solved the problem of subdivision, and if their "candle" system were not quite so expensive, and could be maintained for longer periods, there would remain little to be desired in this direction. It is thus referred to in the *Times* of May 4, 1877:—"It remained for a Russian man of science—M. Paul Jablochkoff, who was formerly in the Russian military service—to demonstrate in practice the feasibility of subdividing the electric current. He has worked out his results in the form of an electric candle, which governs the production of the electric light, and supersedes the ordinary clockwork arrangement. By it he has, moreover, demonstrated the possibility of obtaining several lights from a single source of electricity."

Dr. C. W. Siemens has designed an apparatus for subdividing an electric current, so that several lamps can be burned in one series with a current of electricity from one machine. Lontin has also invented a machine which, from a continuous current of electricity, will develop several separate ones to as many separate lamps, and Gramme has designed a similar apparatus. According to the *Times* of 8th October, 1878, Edison is said to have succeeded in obtaining 1,000 or more lights from one elec-

tric current. Thus the subdivision problem is already partially solved, and will, without doubt, very soon approach a more satisfactory solution.

M. Jamin refers to gas as the retail purveyor and electricity as the wholesale merchant, and Dr. Siemens, during the discussion on the paper on dynamo-electric apparatus at the Institute of Civil Engineers, January, 1878, said he "believed in time electric light stations would be established within squares and large blocks of houses. A 100 horse-power engine would be sufficient to supply conductors for a large number of lights, and they could be increased indefinitely." Sir William Thomson also pointed out how a central station might be taken with 400 lamps, each at a distance of one mile from the station, and with the same set of apparatus it could be so arranged as to obtain the same effect at 400 miles distance. This led him to say that "the economical and engineering moral of the theory appeared to be that towns henceforth would be lighted by coal burned at the pit's mouth, where it was cheapest."

There appears, however, to be little doubt that gas will continue to be employed as much as it is now for a considerable time yet, as the question of subdividing a current of electricity is not yet perfected, and there is yet much to overcome to do so with economy. Dr. Siemens recently drew attention to these facts at Glasgow, thus:—"It would be fallacious to suppose, however, that in resorting to electric light we should be satisfied with anything like the candle power that now satisfies us in using gas, even as we are not now satisfied with the light of lamps and candles since we have become accustomed to gas lighting. There is this further inconvenience connected with electric light, that its rays are so intense that they must not reach our eyes without having first been softened down, either by the interposition of some semi-transparent substance such as ground glass, or by directing the light against screens, or against the ceiling of the room, as was suggested by the Duke of Sutherland, so as to illuminate by reflection only. In making due allowance for these losses of effect, there remains, however, ample margin in favour of the electric light, to make it cheaper and certainly more brilliant than gas light. Its practical application for large halls and places where powerful light effects are required, will therefore be a question only of time, while for domestic purposes gas light will long continue to hold its own owing to the greater facility which it offers of subdividing the effects of the light and of

accommodating its intensity to immediate requirements by opening and closing an ordinary tap."

As the electric light consumes very little oxygen, there is little or no poisonous gas evolved and there is very little heat diffused. It is therefore much healthier than gas. In fact by the generation of ozone the atmosphere is to some extent improved. Mr. R. Briggs has made some calculations as to the relative quantities of impure gases evolved by the two systems of lighting when applied to the Hall of Representatives, Philadelphia, also a comparison of their relative heat effects, and, taking the most unfavourable statement for the electric light, he proves that only one thirty-fourth part as much heat will be given out by electric as by gas lighting (possibly one one-hundredth is much nearer the truth). He then states that "the products of combustion which accompany electric lighting are almost inappreciable. The twelve lamps will burn or consume 19 inches of carbon pencils $\frac{3}{8}$-inch square per hour. The weight of carbon is possibly 3 ounces, and the resulting carbonic acid is, if the carbon is really burned, 5 cubic feet. For comparison the 5,500 cubic feet of gas will demand 6,754 cubic feet of oxygen, producing 3,333 cubic feet of carbonic acid, and 67,100 cubic feet of air must be supplied to effect the complete combustion of the gas (being double the quantity of air which carries the oxygen); while 55,000 cubic feet of air must be furnished each minute to reduce to sufferable temperature the effluent gases."

Safety from fire is another important point in favour of electricity. The lights are ignited and extinguished by starting the apparatus or turning on a commutator, therefore no flame is required to kindle them. There can be no fear of explosions from leaky pipes. The conducting wires are perfectly harmless. Insurance companies will insure works lighted by electricity at a lower rate than those lighted by gas.

For public fêtes nothing could be better than electric light. It was exhibited at the Indian Museum, South Kensington, at the Conversazione of the Institute of Civil Engineers in 1878. The Royal Botanic Society of London employed electric light to illuminate the flower tents during their grand fête at Regent's Park, in June last. Many similar instances might be given to show how the applications are being recognised in England. In France it has been in use to a very much greater extent.

The light from electricity is also comparable with solar light in producing similar actinic effects in photography. Many photo-

graphers in England and elsewhere are using it daily instead of sunlight, and the photographs taken thereby are perfect. The electric arc abounds in actinic or chemical rays which are seen to the best advantage when the carbon points are separated as far as possible, consistently with the continuity of the current.

Mr. Van der Weyde was one of the first to use it for extensive photography in England. He employs a Siemens dynamo-electric machine driven by a gas engine. The electric arc is placed in a large reflector whitened on the inside, so that no direct rays reach the sitter, and any unpleasant effect upon the eyes is avoided. Pictures are taken in this way by an exposure of from eight to ten seconds. Mr. Van der Weyde describes a case where he photographed a lady on her way to the opera, detaining her only five minutes, and delivered a print from the negative in her box before the conclusion of the performance.

The electric light system has been found of great service in ship building, in loading and unloading ships in dock by night, and for use while afloat. Many men-of-war are now fitted with electric apparatus and holophotes for use in torpedo warfare.

The General Transatlanic steamer *Amérique* has been fitted with such apparatus these three years, and several other merchant steamers, both French and English, are now similarly provided. The steam-ship *Faraday*, a cable steamer of 5,000 tons burthen, has a complete set of light apparatus on board, including a light-house or turret. The current generator is of the Siemens type, it is placed in the engine room aft. The leading wires are led forward to the turret on the forecastle in which the lamp or regulator is placed. The light is thrown forward in a fan-shaped beam by means of a set of silvered reflectors before and behind the electric light, all of which condense the rays into a flattened beam to an angle of 225 degrees, so that it may take the place of the mast-head light if required. The whole of the ship's deck and rigging is thus left in darkness, and the officer in charge cannot be dazzled with the brilliancy of the light, while any object outside can be distinctly seen. This light has been found of great service in facilitating loading and unloading the *Faraday* by night as well as in preventing collisions. As an instance of the latter the captain reported, in August last, that while returning from New York, she was passing through a dense fog off Newfoundland, and came very nearly into collision with a large sailing vessel, so near that he could hear the ringing of a bell and the screams of women and children on

board of her, for they could see the bright light of the *Faraday* through the fog. The captain very soon saw the sailing ship, and was thus enabled to steer clear of her. The ships passed at scarcely 20 feet distance from each other, and there is no doubt that the electric light in this instance saved many lives, and as the captain puts it, "We are more than a thousand times compensated for the trouble and expense in fitting our electric light."

It is hoped that the following will be of service in making the description of electric apparatus intelligible.

Magnetism is a physical agent, which is known by the property it has of attracting iron. Magnetic poles of opposite name attract each other, and those of the same name repel.

Electricity has been defined as a powerful physical agent, which manifests itself mainly by attractions and repulsions, but also by luminous and heating effects, by violent commotions, by chemical decompositions, and many other phenomena. It is not inherent in bodies, but is evoked in them by a variety of causes, among which are friction, pressure, chemical action, heat, and magnetism. It is chiefly evoked by the latter in the modern forms of electric light apparatus.

Two kinds of electricity are known, called *static* or high tension, and *dynamic* or voltaic, or low tension electricity. The former is evoked chiefly by friction with substances such as amber, shellac, sealing-wax, sulphur, and glass. The latter, voltaic electricity, with which we shall have most to deal, is evoked by chemical means, as in the galvanic battery, by heat, as in the thermopile, and by magnetism (that is by induction), as in all kinds of magneto and dynamo-electric apparatus.

The currents of electricity from magneto apparatus are *induced* currents. They are described as currents produced in conductors by the influence of neighbouring magnets or neighbouring currents. Professor Faraday discovered them in 1831. He was the first to discover the principle of *magneto-electricity*, and to state the fact that when a magnet is approached or drawn from a bar of iron, around which a helix of wire is wound, a current of electricity is induced in the helix. This discovery of magneto-electric induction marks an epoch in the history of electrical science.

A *magnet* may be regarded as a *series* of *currents*, and a series of currents regarded as a magnet. They are attracted and repelled in a precisely similar way, and currents similarly induced.

The law of Lenz states, that the currents induced by the relative movement, either of the two circuits or of a circuit and a magnet, are always in such directions as to produce mechanical forces tending to oppose the movement.

When a current is similar in direction to that from the copper pole of a galvanic battery it is said to be + or *positive*, and if similar to that from the zinc pole of the battery it is called − or *negative*.

Conductors of electricity are those substances which possess the property of allowing it to pass freely all over their surface.

Non-conductors, or insulators, are those which do not permit it to travel so freely over them. A copper wire when heated does not conduct electricity so well as when cold.

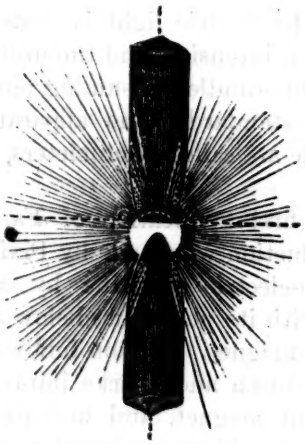
The Electric Arc.—When two carbon pencils are attached to the conducting wires of a powerful magneto-electric machine in motion, or to a galvanic battery of 50 or 60 cells, and their points are brought together long enough to establish the electric current, if they are then separated to a distance of from $\frac{1}{16}$ of an inch to an inch (according to the strength of the current), the current will continue to flow, leaping across from pencil to pencil, emitting a light of great intensity at the space between the points. The name "voltaic" or "electric" arc is given to that portion where the current leaps across from carbon to carbon. See Figs. 1, 2, and 3. The temperature exceeds that of all other artificial sources of heat. Many substances, ordinarily the most infusible, can be volatilized therein.

The light of the electric arc appears to be due to the particles of carbon becoming incandescent as they fly with great rapidity from one point to the other before being consumed. These particles traverse the space chiefly in the direction of the electric current, that is to say, from the positive terminal to the negative, and, as a consequence, when the current is continuously in one direction, the positive carbon consumes at a greater rate than the negative; the ratio is two to one in the open air. In a vacuum the negative carbon increases in length as the positive diminishes.

The positive carbon becomes concave as it consumes, (the form is shown at *a* and *b* in Fig. 1,) while the negative becomes more pointed. If it is necessary to keep the light in one focus, the lamp or regulator for continuous currents must be so constructed that the positive carbon shall be moved towards the focus at about twice the rate of the negative carbon.

The point of the positive carbon becomes more intensely incandescent than the other; and Mr. Douglass, C.E., of the Trinity House, found that, for lighthouse purposes, where the

FIG. 1.



light is not required to be of equal intensity on all sides, if the positive carbon is placed a little behind the negative (see Fig. 2), then the cup-shaped cavity acts as a sort of reflector, throwing a

FIG. 2.

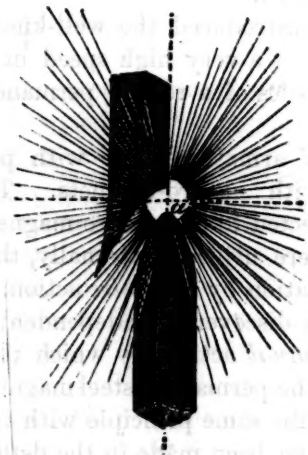
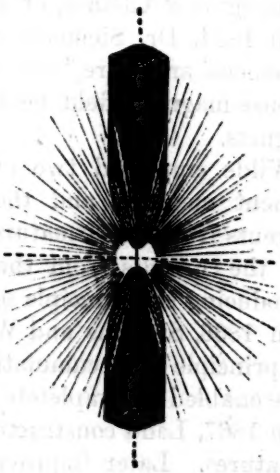


FIG. 3.



very large proportion of the light in the direction of the cup. This also keeps the arc steadily in one position at *a*, instead of shifting around the points, as it usually does when the two carbons are placed as in Fig. 1.

For electric current generating apparatus, giving alternating instead of continuous currents, the regulator is so constructed that the two carbons approach the focus at the same rate, and they each, when burning, assume the same pointed shape shown in Fig. 3.

The intensity of the electric light is measured by comparison with a light of known intensity, and the unit of measurement is the candle. A stearine candle, consuming ten grammes per hour, may be taken as a standard. The apparatus by which light measurement is made are called photometers, of which there are several forms.

Generators.—The first application of Faraday's discovery of magneto-electric induction was made by Pixii in 1833. He constructed a magneto-electric machine by causing a horseshoe magnet to revolve with its poles just below and facing the poles of a vertical electro-magnet. Saxton followed with an improvement, then Ettingshausen and Clarke improved still further by fixing the permanent magnet, and making the electro-magnet coils revolve. These machines produced an uninterrupted series of sparks from the coils by means of the permanent magnets. Professor Nollet, of Brussels, in 1850, suggested the extension of the magnets, improvements by Van Malderen, who used machines for electric lighting, by Holmes, of London, and the Compagnie d'Alliance, of Paris, followed.

In 1854, Dr. Siemens, of Berlin, introduced the well-known "Siemens' armature," which revolves at a very high speed in an intense magnetic field between the poles of a row of permanent magnets.

Wilde employed two of Siemens' armatures, one with permanent magnets, and the other with electro-magnets. The currents from one armature were directed to the electro-magnets, and the currents from the other were utilized externally, thus introducing the principle of accumulation by *successive* action.

In 1866, Siemens and Wheatstone discovered, independently, the principle of accumulation by *mutual* action, by which they were enabled to completely suppress the permanent steel magnets.

In 1867, Ladd constructed one on the same principle with two armatures. Later improvements have been made in the details of construction by Siemens, Gramme, and others.

From the various experiments made to discover the best form of electric light apparatus it appears to be generally admitted that the modern form of the Siemens apparatus gives the best

results. Captain Abney, R.E., conducted a set of experiments in July, 1875, with magneto-electric machines of Wilde, a dynamo-electric machine of Gramme, and a dynamo-electric machine of Siemens. Both the lighting and the photographic effects were compared, and the results were such as to place the Wilde apparatus out of the question, while the Gramme apparatus gave about one half the light of that of the Siemens with the same consumption of power (about 7 horse-power).

As early as 1857 the electric light was suggested for lighthouse purposes. Frictional electricity and that from the voltaic battery were passed over in favour of the magneto-electric machine. Faraday experimented at Blackwall with a machine of Holmes' construction, and it was thoroughly tested in 1858 in the lighthouse at South Foreland. The results were sufficiently satisfactory to induce the Trinity House authorities to have it erected in Dungeness lighthouse in 1862. After that the Nollet machine was tested; in 1871 an improved Holmes apparatus was placed in the Souter Point lighthouse, and in the South Foreland four sets of the same apparatus were erected to supply a light to each of its towers.

Another series of experiments was made at South Foreland for the Trinity House by Professor J. Tyndall, F.R.S., and Mr. J. N. Douglass, M.I.C.E. These lasted from August, 1876, until July, 1877, and they were for the purpose of determining on the electric apparatus best adapted for service at the Lizard lighthouse. The machines experimented upon were—

(1.) Four of Holmes' machines, and one Alliance.
(2.) Gramme's dynamo-electric machines.
(3.) Siemens' large „ „ „
(4.) „ small „ „ „

Dr. Tyndall, in his report thereon, pointed out that the new machines marked a great advance in economy and power as regards their application to lighthouse purposes. Thus the machine of Holmes was found equalled by one of Gramme, which was of considerably less volume and cost. This discrepancy as to cost and volume was still greater in the case of the Siemens machine, which yielded a light sensibly equal to that of Holmes. He also indicated that the magneto-electric machines first employed in lighthouse illumination, are ten times as costly as the latest dynamo machine, fourteen times as heavy, twenty-five times as bulky, and give only one-fifth of the light with practically the same driving power.

TABLE A.—*Statement showing the Cost, Dimensions, Weight, Horse-power absorbed, and Light produced by the Dynamo-Electric Machines tried at the South Foreland*, 1876–77.

Names of machines.	Cost.	Dimensions.			Weights.	Horse-power absorbed.	Revolutions per minute.	Light produced in standard candles.		Light produced per horse-power in standard candles.		Size of carbons.	Order of merit.
		Length.	Breadth	Height.				Condensed beam.	Diffused beam.	Condensed beam.	Diffused beam.		
	£	Ft. in.	Ft. in.	Ft. in.	tns. cwt. qr. lbs.								
Holmes	550	4 11	4 4	5 2	2 11 1 7	3·2	400	1,523	1,523	476	476	⅛″ × ⅛″	6
Alliance	494	4 4	4 6	4 10	1 16 1 21	3·6	400	1,953	1,953	543	543	⅛″ × ⅛″	5
Gramme (No. 1)	320	2 7	2 7	4 1	1 5 2 0	5·3	420	6,663	4,016	1,257	758	⅛″ × ⅛″	4
Gramme (No. 1)	320	2 7	2 7	4 1	1 5 2 0	5·74	420	6,663	4,016	1,257	758	⅛″ × ⅛″	4
Siemens (Large)	265	3 9	2 5	1 2	0 11 2 18	9·8	480	14,818	8,932	1,512	911	11/16″ × 11/16″	3
Siemens (Small, No. 58)	100	2 2	2 5	0 10	0 3 3 0	3·5	850	5,539	3,339	1,582	954	¼″ × ¼″	2
Siemens (Small, No. 68)	100	2 2	2 5	0 10	0 3 3 0	3·3	850	6,864	4,138	2,080	1,254	⅛″ × ⅛″	1

TABLE B.—*Statement showing the Horse-power absorbed and Light produced by Machines Coupled in Parallel Circuit.*

Names of machines.	H.P. absorbed.	Revolutions per minute.	Light produced in standard candles.		Light produced per h.p. in standard candles.		Size of carbons.
			Condensed beam.	Diffused beam.	Condensed beam.	Diffused beam.	
							In. In.
2 Holmes	6·5	400	2,811	2,811	432	432	$\frac{1}{2} \times \frac{1}{2}$
2 Gramme	10·5	420	11,396	6,869	1,085	654	$\frac{11}{16} \times \frac{11}{16}$
2 Siemens small (Nos. 58 and 68) ..	6·6	850	14,134	8,520	2,141	1,291	$\frac{11}{16} \times \frac{11}{16}$

Mr. Douglass also gave a full report of each day's work during the course of experiments, and sums up the results in the tables (A) and (B). The latter gives results when the electric machines were worked together in pairs, or what is called technically "coupled." Dr. Tyndall then said, "I entirely concur in the recommendation of Mr. Douglass, that the small Siemens machine, recently tried at the South Foreland, be adopted for the Lizard. From the first I regarded the performance of this handy little instrument as wonderful. It is simple in principle, and so moderate in cost that a reserve of power can always be maintained without much outlay. By coupling two such machines together a great augmentation of the light is, moreover, attainable."

The Lizard Lighthouse is now fitted with six sets of these apparatus, erected in pairs, and so arranged that they can be worked either singly during fine weather, or "coupled" electrically in pairs during thick weather.

The principle of the Siemens and the Gramme, in fact of all dynamo-electric and magneto-electric machines, is the same. The following will sufficiently describe both the Gramme and the Siemens:—

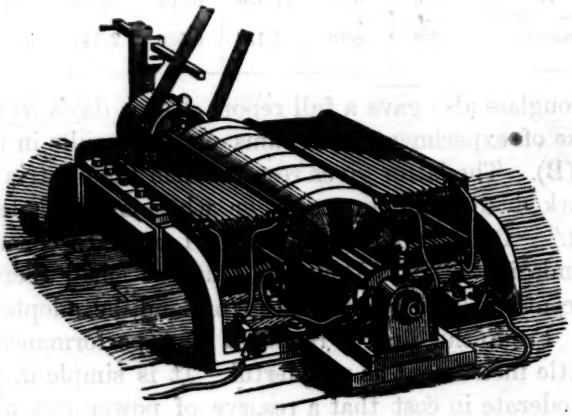
A closed electric circuit, consisting of a coil of insulated copper wire, is caused to rotate in the immediate neighbourhood of the two magnetic poles of an electro magnet. In that circuit electric currents are induced. In both machines there are many such coils of insulated wire, and they form what is called an armature.

The Gramme armature is made up of a ring of iron wire, and the coils of insulated wire are placed side by side so as to cover

the iron ring inside and out. This is known as the Gramme ring ; it is a modification of that by Dr. Pacinotti, who used a ring of solid iron instead of iron wire.

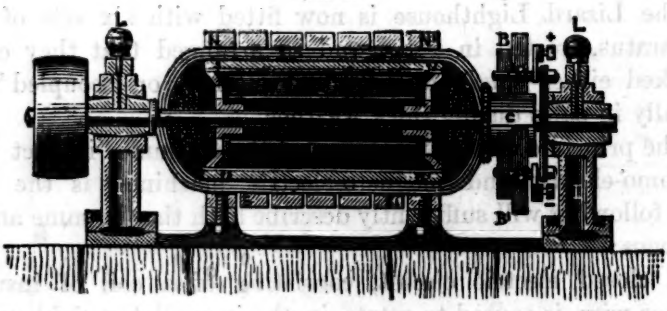
The armature of the latest Siemens machine is an improvement on the Siemens armature invented in 1856, it consists of a cylinder of iron, or of iron wire, around which the insulated wire is coiled longitudinally so as to cover the outside of the cylinder. Fig. 4 gives a perspective view of the Siemens

FIG. 4.



machine, and Fig. 5 a longitudinal section, in which *nn' ss'* re-

FIG. 5.



present the iron cylinder of the armature with its coils of wire lengthwise.

In the Pacinotti and Gramme rings, only the wire on the outside is subjected to the influence of the electro-magnets, whereas in the Siemens armature the whole of the wire is acted upon, except the portions which cross the two ends of the cylinder.

This revolving armature is enclosed at the top and bottom, to the extent of two-thirds of its cylindrical surface, by curved soft iron bars NN′, SS′, and their prolongations form the cores of the electro-magnets, which are at the two sides of the armature. The insulated wire coils of both the electro-magnets are connected with the brushes BB′ of the commutator C, and form, with the wires of the revolving armature, one continuous electric circuit.

When the armature is first caused to revolve, a feeble current of electricity is induced in its coils, by the infinitely small amount of remanent or residual magnetism (which always exists in soft wrought iron), and this feeble current is directed through the segments of the commutator, through the brushes to the electro-magnet coils, thus strengthening the magnetism of the iron bars, which, in their turn, induce a stronger current in the revolving armature coils. The strengthened current again traverses the electro-magnets, which, in their turn, react upon the armature, thus, by mutual reaction, from infinitesimal currents, we obtain a current of enormous energy, only limited by the insulation of the wire and the magnetic saturation of the soft iron.

During each revolution the greatest inductive effect upon the coils of the armature is when they approach the poles of the electro-magnet, and it sinks to zero as they pass the poles; so that there are two currents induced during each revolution, one being in the positive direction and the other in the negative. These alternating currents are conducted to their proper divisions of the commutator C, shown in Fig. 5, so that they produce a continuous positive current towards one brush B, and a continuous negative current towards the other brush B′.

The brushes consist of thin plates of metal, or simply combs of copper wire, placed so as to press lightly upon the commutator at two opposite points, so that one brush collects the positive electricity and the other the negative.

The number of divisions or separate coils on the Siemens armature varies from eight to fifty-six, and that of the Gramme, being of larger diameter, nearly double the number of coils are sometimes employed.

The Brush machine, invented by M. C. F. Brush, of America, is one of the next in value for light-giving to the Siemens and Gramme. It has two electro-magnets of the horse-shoe type placed side by side, with their similar poles facing each other, at

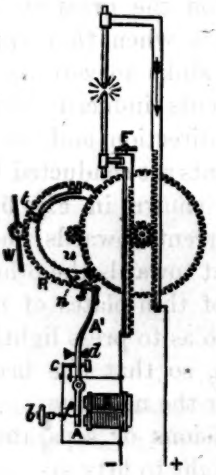
such a distance apart that the armature can just rotate between them. The armature ring is, like the Pacinotti, of iron, with coils of insulated copper wire at regular intervals, and the spaces between them filled with iron so that the outside is cylindrical.

Machines of other types might be referred to with advantage, such as those of the Niaudet, Varley, Wild, Weston, Lontin, &c., but a full description of each would exceed the limits of this paper.

For machines giving alternate currents the names of Holmes, Compagnie d'Alliance, also specially designed apparatus by Lontin, Gramme, and Siemens may be referred to. These require lamps of slightly different construction to those giving continuous currents. The alternating current machines are those best adapted to the Jablochkoff candle system.

Regulators.—There are many modifications of electric lamps, or carbon regulators, nearly all of which depend upon the principle that the current strength diminishes as the distance between the carbon points increases. A few of the inventors' names are as follow:—Duboscq, Foucault, Regnier, Marcus Brush, Lontin, Rapieff, Gaiffe, Serrin, and Siemens. The two

FIG. 6.



last inventors have produced some of the best types. The Serrin lamp is much used in France with the Gramme machine, and the Siemens is used in Russia, Germany, and England with the Siemens machine. Fig. 6 is a diagram to show the action of the Siemens lamp. The leading wires from the dynamo-electric

machine or battery are marked × and —. E is a horse-shoe magnet, which, when the current is passing, attracts the iron armature A, which forms part of a vibrating lever A′, this is drawn from the magnet by the spring *f* and the regulating screw *b*. While working, the lever is capable of vibrating between the stops at *d*. At the top of the lever a spring pawl engages with a ratchet wheel *u*, so that as it vibrates the wheel is caused to revolve. When, through the separation of the carbons, there is not sufficient room to move A′, the upper carbon begins to descend, as indicated by the arrow, while the bottom one ascends at half the rate until the carbons meet, or until the arc is reduced sufficiently to re-establish a stronger current. As the arc is diminished the resistance to the current also diminishes, so that an increased current results until the armature A begins to oscillate again, which has the effect of keeping the carbons at their best working distance. Thus, the arc is kept as nearly as possible constant by the differential action of gravity and magnetism.

Like the later forms of Serrin lamp it does not require winding up.

Lamps of the Siemens type are employed at the Lizard lighthouses capable of burning for eight hours continuously.

There are many other very good forms of lamp fulfilling the conditions referred to above more or less perfectly. Waring, Prosser, and others have sought to produce a light by causing very fine jets of mercury to meet, and passing an electric current through them which volatilizes the mercury. The incandescent vapour gives an intense but greenish light.

Prosser and Reguier have employed circular plates or discs of carbon in their lamps; the point where the light is emitted is changed continually by rotating the carbon discs.

Others have endeavoured to obtain electric light by incandescence of various substances, including carbon, in a vacuum, so that the material should not be consumed, but the difficulties attending this method have not yet been satisfactorily overcome.

The Jablochkoff electric "candle" system demands special attention, as it not only proves the practicability of dividing the electric current, but it dispenses with the mechanism of the ordinary lamp, with the attendance required thereon, and in its stead is placed a so-called "candle." The Jablochkoff "candle" consists of a pair of carbon spindles, placed parallel to one another,

with an insulating earthy substance, such as kaolin or plaster of Paris, between them. These carbons are usually about eight inches long. Fig. 7 is an elevation of the candle.

Fig 7.

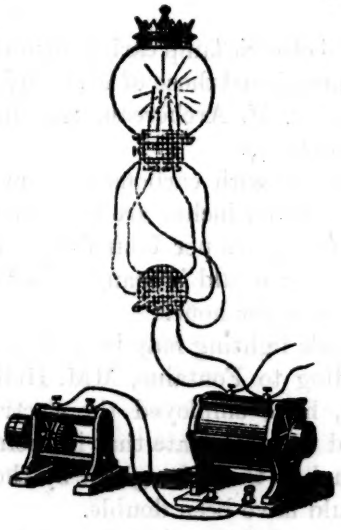
From the current-generator, which for the best effect must be such as to give rapidly alternating currents, wires are attached to the lower extremities of the carbon spindles, and a small piece of carbon is placed at the top to afford a passage for the electricity until the candle ignites. When it has ignited the insulating material volatilises, and consumes equally with the carbons, while the voltaic arc plays between the upper extremities of the carbons. The process may be roughly compared to that of the combustion of an ordinary candle, where the kaolin takes the place of the wick.

The "candle" system has already led to very important results. The Paris Exhibition of 1878 and several of the most important public places in Paris were illuminated nightly by it as well as by electric lamps. The large white globes of the lamps in the Avenue de l'Opera are mounted on high posts. They each contain four "candles," which are capable of burning from one hour and a half to two hours per candle. As soon as one candle has burned out, an attendant, by turning the handle of a commutator, shifts the electric current to the next candle, which at once ignites and burns for another hour and a half. While the change is being made from one candle to the next a reddish light is emitted through the opal globes, until the newly ignited candle becomes incandescent. The change was made twice or thrice in each evening, and at half-past twelve the gas lamps were substituted for the rest of the night. The candles referred to were connected by leading wires to an alternating current machine, fed by a continuous current machine of the Gramme type. Each machine supplied sixteen "candles" in four groups of four in each, as illustrated in Fig. 8. In some cases two candles were burnt at one time in each globe, to reduce the blinking and to give a brighter light.

The Lontin apparatus for producing several lights from one machine has given very satisfactory results; that of Gramme, referred to, is somewhat similar in principle. In the Loutin generator a series of small electro-magnets are attached radially to a revolving spindle. The ends of the wire of the bobbins are

attached to the segments of a commutator so as to form one continuous circuit. This machine when rotated produces a continuous current of electricity, which is led to a second apparatus for the purpose of subdividing the current. This it does by means of a set of bobbins placed radially, similar to those of the generator,

FIG. 8.



which induce in a series of electro-magnet coils, forming an external ring, a number of separate currents. These independent currents may be led to as many lamps, or to batches of Jablochkoff "candles," or they may be coupled up together into one circuit for a very powerful light.

The pencils for the electric lamp are usually of carbon. Their composition and manufacture are questions of the utmost importance, as the light produced therefrom varies very much with the different kinds. The carbon taken from the interior of gas retorts is tolerably pure for this purpose, but it varies so much in density that some specimens are perfectly porous and others are quite hard and impermeable. With powerful currents retort carbons are apt to burn irregularly and to splinter off. The best carbons are those which are carefully manufactured, on account of their homogeneity. For this purpose retort carbon and coke are selected as pure as possible, reduced to a very fine powder, washed to remove all soluble salts, and then pressed in moulds by means of hydraulic presses or otherwise to about seven or eight

tons on the square inch. The sticks so formed are then thoroughly soaked in a solution containing sugar and gum; they are then baked or burned until the sugar is carbonised. After this, they are, by some manufacturers, electroplated with a thin film of copper, which prevents their burning to too sharp a point in the electric lamp; it also prevents splitting. The various operations require great care and take much time before a carbon is ready for use.

There are several electric lamp carbon manufacturers in France, of whom may be mentioned those of M. Carré, M. Gaudoin, MM. Sautter et Lemonnier, M. Archereau, and in England those of Messrs. Siemens Brothers.

In an ordinary lamp with carbons of from 9 to 15 millimetres in diameter about 2½ to 3 inches are consumed per hour, costing from twopence to fourpence per hour for the carbons only. The expense of steam power would in many cases be covered by a half-penny per horse-power per hour.

The cost of electric lighting may be gathered from the following facts. According to Fontaine, MM. Heilman and Co., machine-tool makers, have employed the electric light during the last four years, and they calculate that if their foundry had been lighted by gas equal to the light given by the electric light machine, the cost would have been double.

M. Manchon has used it in a cloth factory to light up his looms; he finds that the saving is 22·6 per cent., besides the advantage of being able to see the most delicate shades of colour and of renewing broken threads without falling into errors.

At Messrs. Siemens' telegraph works, Woolwich, the workshops have been lighted by electricity for the last three years with an economy of two to one in favour of electricity.

At M. Dieu's workshops gas would cost two and a quarter times as much as electricity.

Many other cases might be adduced to prove that under some circumstances electric lighting is very much cheaper than gas lighting. The economical ratios under different circumstances vary very much. When the ratio of light intensities is taken as the ratio of efficiency, the advantage is about twenty to one in favour of electric lighting.

JNO. R. BRITTLE.

METROPOLITAN WATER SUPPLY.

THE increased interest felt on all sides in subjects relating to the public health, and the attention given not only by the Government and by local bodies but by heads of families and individuals to sanitary matters, have naturally tended to bring into prominence the oft-debated question of the best means of improving and extending the national water supply. In London and other large towns the growth of the population, and the consequent demands made upon existing sources, have led to a re-examination of the subject from all points of view—sanitary and economic—and by Parliament, by Royal Commissions, and during the past few months by a Committee of the Society of Arts, evidence has been obtained from experts as to the source and character of our present supply, while numerous plans—some practical, others obviously Utopian—have been put forward for the remedy of defects and to meet the growing wants of the people. Before glancing at the present state of the question it will be well to collect a few historic data showing the stages by which we have reached our present comparatively satisfactory condition as far as London is concerned, and then it will be possible to arrive at a clearer appreciation of the views of the eminent men who have devoted much thought to the subject.

In its earliest days when London had its pleasant fields and springs it was, we learn from the old chronicler Stow, watered not only by the Thames on the south, but "by the river of the Wells," as it was then called, "on the west, with a water called Walbrook running through the midst of the City into the River of Thames, severing the heart thereof; and with a fourth water or bourn which ran within the City through Langbournward. In the west suburbs was also another great water called Oldborn, which had its fall into the River of Wells." FitzStephen, another old chronicler, speaking of the northern suburbs, tells us of "choice fountains of water, sweet, wholesome, and clear, streaming forth among the glistening pebble-stones." Among these, he adds, "Holywell, Clerkenwell, and Saint Clement's Well are of most note and frequented above the rest, when scholars and the youth of the City take the air abroad in the summer evenings." The "River of Wells" was formed by the confluence of the streams which FitzStephen here describes, and it was also known subsequently as the "Fleet River," and in its degenerate days as the "Fleet Ditch," when, after having

borne barges up to Holborn Bridge, it became so offensive that in 1732 Parliament decreed that it should be filled up. When these natural supplies of water failed to meet the wants of the citizens artificial means were resorted to, and in the twenty-first year of his reign Henry III granted to Gilbert Sanford liberty to convey water from the town of Tyburn by pipes of lead into the City. The pipes, which were of 6-inch bore, carried the water to Cheapside, where the first of the conduits, destined to become so important a feature in the City, was built near Bow Church, where it was retained until after the great fire. These conduits were made ornamental as well as useful, for of one, which stood at the south end of Shoe Lane, in Fleet Street, we read that, "On the same was a fair tower of stone garnished with images of St. Christopher on the top, and angels round about lower down with sweet sounding bells before them, whereupon, by an engine placed in the tower, they divers hours of the day with hammers chimed such an hymn as was appointed." Another famous conduit, the name and site of which are still preserved in Lamb's Conduit Street, was founded in the reign of Henry VIII by William Lamb, a gentleman of the Chapel Royal, who caused several springs to be connected so that they formed a head of water, which was carried in a leaden pipe to Snow Hill, a distance of 2,000 yards, to another conduit. The water from these central stores was, of course, conveyed by hand to the dwellers in the neighbourhood, and Lamb is said by Stow to have given "to poor women, such as were willing to take pains, 120 pails therewith to carry and serve it." Lamb's conduit was rebuilt in 1667 from a design by Wren, and it was taken down in 1746, by which time the majority of the other conduits had disappeared. The conduits were at times the centres of considerable festivity, and Stow tells us that "on the 18th of September, 1562, the Lord Mayor (Harper), aldermen, and many worshipful persons and others of the masters and wardens of the twelve companies rid to the conduit heads for to see them after the old custom." This inspection was no mere official formality, for "afore dinner they hunted the hare and killed her, and thence to dinner at the head of the conduit. There was a good number entertained with good cheer by the Chamberlain, and after dinner they went hunting the fox. There was a great cry for a mile, and at length the hounds killed him at the end of St. Giles's." On some notable occasions liquids stronger than water flowed from the conduits, as at Anne Boleyn's coronation,

when claret poured forth from the conduit in Cheapside. The fountains attached to the conduits formed a great ornament to the streets, as in the case of the conduit erected in 1655 in Leadenhall Street.

The conduit in 1581 or 1582 was supplemented by a more important means of supplying the City with water, introduced by a Dutchman named Peter Morrys or Morris, or as Harrison in his "New History, Description, and Survey of London," describes him, "Peter Maurice, a German." This ingenious person applied to the Lord Mayor and aldermen for permission to supply the City with Thames water by a mill to be worked by the water fall at the return of the tide under London Bridge. The Corporation approved the scheme, and granted Maurice a lease of one arch and a place for fixing his engine at the north end of the bridge for 500 years at the nominal rent of ten shillings a year. Two years later he obtained the lease of two additional arches, and the property remained in the hands of his heirs until 1701, when it was sold to Richard Soams, a goldsmith, for £36,000. It was subsequently transferred to a company.

In Maitland's "History of London," published in 1756, there is (Book 1, chap. VII) an exhaustive description of Maurice's machinery, showing that it raised 46,896 hogsheads of water per day to a height of 120 feet. Each wheel worked sixteen pumps. The benefit of these primitive waterworks was so well appreciated that when, in 1746, the condition of London Bridge was under consideration by the Committee of Bridge House Lands, at Guildhall, one of the questions raised was "what effect will (the proposed alteration) have upon the waterworks, and if it should render them useless or not sufficient, how and in what manner may the City be otherwise supplied with water?"

This was, however, at the best only an expedient, and the water was only carried as far as Gracechurch Street, so that when in 1605 a more extended scheme for bringing to London the streams of Hertfordshire was mooted it attracted considerable attention and was sanctioned by Parliament. Queen Elizabeth had previously granted a liberty to the citizens to cut and convey a river from any part of Middlesex or Hertfordshire to the City of London; but a limit of ten years was imposed for the completion of the work, and no one was found to attempt it. King James granted similar powers, without limitation as to time; but the civic body shrank from the responsibility of working out the scheme, and it was only when Mr. Hugh Myddelton offered

to undertake the task if the Parliamentary powers were transferred to him that the enterprise was actually floated. Mr. Myddelton commenced the gigantic work on the 20th of February, 1608, and as Maitland quaintly tells us "in five years space the work was fully accomplished after great art, pains, and industry had been bestowed in the passage of it; on account of the grounds not being all of the like nature, some being owzy and very muddy, others again stiff, craggy, and stony." The same chronicler adds: "The depth of the trench in some places was full thirty feet if not more; whereas in others it required great art to mount it over a valley in a trough between two hills, and the trough all the while borne up by wooden arches, some of them fixed in the ground very deep, and rising above twenty-three feet in height. The channel is narrow, but runs in a winding course forty miles before it reaches this city, and has about a hundred bridges over it." The close of the work, in the course of which Myddelton was compelled to appeal to the King for funds after exhausting all his own resources, is thus briefly described by the historian: "Being brought to the intended cistern (at Islington), but the water not yet let into it, on Michaelmas Day, anno 1613, the day on which Sir Thomas Myddelton, Knight, brother to Mr. Hugh Myddelton, was chosen Lord Mayor for the year ensuing, Sir John Swinnerton, the Lord Mayor, at that time accompanied by the Lord Mayor elect, Sir Henry Mountague, Recorder of London, and many other worthy aldermen, rode to the cistern, and the first issuing of the river thereinto." The ceremony was of a peculiar character. A company of labourers, about sixty in number, handsomely apparelled with green caps, carrying spades, shovels, pick-axes, and other implements of labour, marched thrice round the bason, and then one of the number, stopping before the Lord Mayor, addressed him in a set of lines written for the occasion, which, after recounting the labour of the undertaking, concluded in the following words:—

> "Now for the fountains: flow forth precious spring
> So long dearly fought for; and now bring
> Comfort to all that love thee: loudly sing
> And with thy crystal murmurs shook together,
> Bid all thy true well-wishers welcome hither."

"At which word," says Maitland, "the sluices being opened the stream ran plentifully into the bason, under the sound of drums and trumpets, the discharge of divers chambers and loud acclamations of the people. Sir Hugh Myddelton, with the

assistance of King James I, and the mayor and commonalty of London, is supposed to have expended 500,000*l.* in bringing this work to town, but so poorly did it answer at first that the projector was almost ruined by it, whereupon the King, who was entitled to a moiety of the profits, relinquished his share, reserv- only 500*l.* per annum out of it." At the date when Maitland wrote the company supplied 300,000 houses with water. In 1622, the King knighted Myddelton, but although he gained honour and the thanks of the community his company failed to attract, and for eighteen years there was no dividend at all, whereas a share has of late sold for 90,000*l.* "Thus," to use the somewhat magniloquent words of the report of the Royal Commission of 1869, "was introduced into the metropolis a true systematic 'water supply by gravitation,' after the manner of the ancients." During the seventeenth century the New River and the London Bridge works were the sources of water supply for the whole of the metropolis, but the plans for the new bridge involved the removal of the machinery, and ultimately the New River Company agreed to extend its supply over the city. The Company has, by virtue of an annual rent, the right to a partial supply from the Lea, but practically its own waters are sufficient for all demands. The magnitude of the undertaking, and its extension and maintenance, have combined to render the company one of the most important organisations in the metropolis, and fortunate are those whose ancestors invested in what at first seemed financially an unproductive scheme.

The second company which entered the field was styled the York Buildings Waterworks Company, established in 1691, to supply a part of the Westminster district with water pumped from the mains at Charing Cross. These works were in 1818 leased to the New River Company, and eleven years later were abolished. The Chelsea Waterworks, established in 1723, for supplying the adjacent district, obtained in 1726 a royal warrant to convert into reservoirs two ponds in St. James's Park, and in 1727, a warrant for a similar reservoir in Hyde Park. The works were established at Chelsea Reach, on the north bank of the Thames. During the century several improvements were made in the methods by which the water was conveyed by the companies to their respective districts, and iron took the place of wood as the material for the pipes. Next in order of date, though not of actual working, came the Grand Junction Waterworks first projected in 1798 for the supply of Paddington from

the canal. An Act of Parliament was obtained, but it was not until 1811 that the works were commenced, and then they were delayed by the failure of the plan of using stone pipes recommended by Rennie, the engineer. The company's first supply of water was drawn from the canal, which, in its turn, was formed from the Colne and the Brent, and from streams in the Ruislip Vale, and when this was found unsuited for drinking purposes resort was had to the Regent's Canal with so little improvement in the quality that at last the Thames was used, and in 1820 works were established near Chelsea Hospital. Owing to the nearness of the mouth of the Ranelagh sewer to the point whence the supply was drawn, another move was made, and ultimately works were built near Kew Bridge, whence by a pipe, six miles long, and thirty inches in diameter, the water is forced to Paddington. Before, however, the Grand Junction had got into working order, the West Middlesex works were planned, and in 1806 the directors obtained an Act. After forming a reservoir at Kensington, drawing the supply from the Thames at Hammersmith, they formed another reservoir at Primrose Hill, which can draw two million gallons a-day from the river, and supplies houses situated in some cases at a distance of ten miles. About the same date, the South London Waterworks were established, with powers extending to Bermondsey, Rotherhithe, Deptford, Lambeth, Newington, Camberwell, Dulwich, and Clapham, but in 1834 the name was changed to the Vauxhall Works. The Southwark Waterworks, originally the offspring of the primitive system by which South London was supplied from works under the arches on the south side of Old London Bridge, and by ponds at Saint Mary Overie, removed its works to Battersea, and supplied a district almost conterminous with that of the Vauxhall. The folly of competition was intensified when the Lambeth Waterworks, which in 1832 had formed large reservoirs at Brixton Hill, also travelled over the same district, until sometimes three sets of pipes were laid down in the same street. In 1845, two out of the three companies came to an amicable arrangement, and were united as the Southwark and Vauxhall Water Company, with powers to enlarge the Battersea reservoirs belonging to the Southwark Company. In 1848, the Lambeth Company was entirely reconstructed; its district was extended from Lambeth into the south-west, and it was authorised to take water from the Thames at Long Ditton. In East London waterworks had been established

at Shadwell and West Ham, for the districts beyond the reach of the New River or the London Bridge works, but in 1806 a company, with the title of the East London Waterworks Company, obtained an Act, and erected works at Old Ford, in addition to which it purchased the old works at Shadwell and West Ham from the London Dock Company, which had bought them up. The Kent Waterworks Company, incorporated in 1810, took possession of some ancient works on the River Ravensbourne, near Deptford, which had been established as far back as 1699. Down to 1857 this old stream was their only source of supply, but in 1862 it was abandoned in favour of wells sunk into the chalk, three of which are at Deptford, two at Charlton, and one at Plumstead, Bromley, and Crayford. An additional supply for a part of the metropolis is obtained from wells sunk in 1844 for the Government near Charing Cross. They penetrate deeply into the chalk, and furnish about 430,000 gallons a day to the Government offices, and to the fountains in Trafalgar Square. The only source of supply remaining to be noticed, as far as the metropolis and its suburbs are concerned, is the Hampstead Waterworks, and these have ceased to have any separate existence, having been taken over by the New River Company. The wells, although not used, are available, and the water from the Hampstead and Highgate ponds is used only for road watering.

Before leaving this part of our subject it will be interesting to show the growth of the demand, and of the supply, as evidenced by the returns of the companies.

Company.	Number of Houses Supplied.				
	1820.	1827.	1833.	1867.	1877.
Thames :—					
Chelsea	8,631	12,409	13.892	26,875	28,859
West Middlesex	10,350	14,500	16,000	36,881	50,135
Grand Junction	7,180	7,809	8,780	27,190	37,910
Southwark and Vauxhall	.. 5,200	6,900 10,000	7,100 12,046	71,558	79,440
Lambeth	11,487	15,987	16,682	38,320	57,835
Lea :—					
New River	52,082	66,600	70,145	113,462	126,071
East London	32,071	42,000	46,421	92,652	113,192

The figures for 1877 represent the number of houses supplied in December last. Of the quantity supplied it is not so easy to form a certain estimate for the earlier years, but we can obtain approximate figures at as far back as 1828, from the investiga-

tions conducted in that year by Dr. Roget, Mr. Brande, and Mr. Telford, the figures for the later years being from returns supplied by the directors of the companies.

Company.	Gallons in 24 hours.			
	1828.	1856.	1866.	1877.
Chelsea	1,760,000	5,323,000	8,000,000	9,433,500
West Middlesex	2,250,000	6,895,388	8,208,168	10,868,645
Grand Junction	2,800,000	6,714,292	9,317,055	12,237,074
Southwark and Vauxhall	720,000 / 1,000,000	10,331,122	12,502,000	19,400,000
Lambeth	1,244,000	6,109 000	8,950,000	14,940,300
Total from Thames ..	9,774,000	33,686,052	46,977,223	66,879,519
New River	13,000,000	25,000,000	22,898,769	29,515,000
East London	6,000,000	16,000,000	19,380,000	29,583,448
Total from Lee and New River	19,000,000	41,000,000	42,278,769	59,098,448

The Acts obtained by the various companies conferred upon them such extensive powers, and the fact that they had obtained the control of a supply which was essential not only to the comfort but to the life of the people was so obvious, that no long period elapsed before they combined to raise their rates, a proceeding which, just as naturally, led to a public outcry, and in 1821 a committee of the House of Commons was appointed to consider the subject. The deliberations of the committee were careful and complete, and the conclusion at which they arrived was that, while London enjoyed a supply of water far superior to that possessed by any other city, it was desirable that the maximum charges of the companies should be settled by legislative enactments, and that Parliament should also enforce rules for the prevention of waste and for other salutary purposes. As is so often the case with Parliamentary committees and commissions, the recommendations of this report were never carried out, and the subject dropped for a few years until in 1828 the public feeling was again excited, owing to an impression, for which there proved to be very considerable ground, that the quality of the water was not satisfactory. A Royal Commission was appointed, consisting of three scientific men: Mr. Telford, civil engineer, Professor Brande, chemist, and Dr. Roget, secretary to the Royal Society, with instructions to inquire into "the description, the quality, and the salubrity of the water," supplied to the metropolis. The Commission was at first entrusted with the

further task of suggesting, if necessary, new methods or sources of supply, but it was subsequently directed not to proceed with this inquiry. After making careful analyses and investigations, the Commission reported that Thames water, when free from extraneous substances, was not unfit for domestic use or injurious to health, but that as it approached the metropolis, it became loaded with filth, which rendered it disgusting to the senses and improper to be employed in the preparation of food. The Commission considered also that the supply was capable of and required improvement, that many of the complaints as to its quality were well founded, and that steps ought to be taken to secure its cleanliness and purity. The report indicated that in the opinion of the Commission the pollution of the river-water was due to its reception of sewage and refuse from manufactories, most of which might be removed by filtration through sand, and it does not appear that they contemplated the possibility or necessity of any such large measure as the removal of the companies' points of intake above the range of the tidal flow. The companies at once took up the suggestions of the Commission as regarded the filtration of their water, and the Chelsea Company, in 1829, established a large filter, an acre in extent, and its example has since been extensively followed. It was found, after numerous experiments that the only appropriate material for mechanical filtration was fine sand, the great difficulty being to prevent the sand from becoming clogged. After trial it was seen that by far the greater quantity of the impurities was held in suspension by the agitation and motion of the water, and that if it was allowed to stand for some time at perfect rest in a reservoir the heavier and grosser particles were deposited by simple subsidence, leaving only a small proportion of lighter and finer matter to be dealt with by filtration. It was also found that when the water was allowed to filter downwards through a porous bed of sand held up in its place by underlying layers of coarse gravel, the dirt did not penetrate into its mass, but was stopped at the upper surface, so that the whole cleaning operation necessary was to scrape this surface off to a slight thickness, and when it had become too much diminished, to put fresh sand on. Such was the plan adopted by the Chelsea Company, and those companies which did not adopt it took other measures, such as the construction of extensive settling reservoirs, and the removal of their works to points where a purer supply was obtainable.

At the same time, while the companies thus showed their

readiness to anticipate the wishes of Parliament, further action was taken on the report of the Royal Commission, and a Committee of the House of Commons, while endorsing the views contained in the report, recommended that Mr. Telford should be instructed to look out for new sources of supply. He ultimately recommended that the northern side of London should be supplied from the River Verulam above Watford, and the southern side from the River Wandle; but, after being discussed by the House of Commons in 1834, and the House of Lords in 1840, when the Peers referred the report of the former Commission of 1828 to a Committee, the only step taken was to report the evidence to both Houses, no further progress being made in either case. Meanwhile the subject was being incidentally considered by another important public body charged with the task of recommending schemes for sanitary reform—the Commission appointed in 1844 to investigate the sanitary state of large towns, which made one report in that year and another in 1845. The reports showed conclusively that the assertion of the Royal Commission of 1828 as to the superiority of the London supply was by no means exaggerated, for it was found that in Bristol, with its 120,000 inhabitants, only 5,000 had water laid on to their houses, while at Newcastle-on-Tyne the people were still dependent on "sale-pants," or public pumps, where water was sold by a company to persons bringing their own vessels at the rate of a farthing for five gallons. In some of the larger suburbs at the date of this report (1845) the Commissioners found that water was still supplied by carriers at a rate of fivepence for 1,000 gallons. As the supply of water to houses was at that date only undertaken when the landlords became responsible for the rate, the Commissioners found that many houses were entirely without this all-important necessary, and they submitted a series of recommendations in favour of making it imperative on the local administrative bodies charged with the management of sewage and drainage to procure a supply sufficient not only for the domestic purposes of the inhabitants, but also for cleansing streets and drains and extinguishing fires. The report also recommended that houses should be rated for water supply in the same way as for sewage and other local purposes, the owners of small tenements being made liable for payments.

The all-important question whether water supply should be left to companies or local and municipal bodies was being debated with as much earnestness then as it has been in late years, but

no alteration in the existing law was made, although an Act was passed in 1847 (10 Vict., c. 17) to consolidate the numerous statutes relating to the subject. By slow but sure degrees, however, the water of the Thames became exposed to increasing contamination; the drainage works which relieved the houses by abolishing the old cesspools poured their filth into the river, while even another public benefit—the establishment of the small steamers—brought mischief with it, as the continual movement of the water stirred up the matter which had rested quietly at the bottom. The outbreak of cholera in 1849 was the means of drawing fresh attention to the quality of the water, and the Board of Health, then recently established, published a voluminous report, in which it recommended the drawing of a new supply from the gathering grounds in the Bagshot Sands and in the district known as the Hind Head, south of Guildford. This Board in its report, issued in 1850, objected to the Thames altogether as a source of supply for domestic purposes in the following terms: "Whilst we believe that Thames water taken up beyond the influence of the metropolitan drainage, and filtered, may be used without injury to the public health, and may be employed temporarily until other sources can be laid under contribution, we advise that Thames water and other water of like quality as to hardness be as early as practicable abandoned." This attack upon old Father Thames was so direct that it could scarcely be accepted without further investigation, and the duty of examining it was entrusted to yet another Committee of the House of Commons, who, discredited the conclusions of the Board, and the result of the conflict of opinion was the appointment of another Royal Commission of eminent chemists—Professor Graham, afterwards Master of the Mint, Dr. Miller, and Dr. Hofmann. These gentlemen were ordered to investigate the quality of the water actually supplied from the Thames, the proposals of the Board of Health for a new supply, and the scheme of the London Spring Water Company, recently formed, which proposed to supply the metropolis with spring water from the chalk in the neighbourhood of Watford. The Commission thus constituted came to the conclusion that the Thames water supplied by the companies was perfectly wholesome, palatable, and agreeable; uniform, plentiful, and safe in use; but they recommended, that to avoid the liability to contamination by the London sewage, the supply should be drawn from a point above the tidal range. They reported against the Board of Health

scheme, but in favour of the Watford Company, assuming that the hardness of the spring water could be got rid of.

After inquiries, which, as we have shown, had occupied numerous Commissions and Committees, the Government considered that the time for legislation had at length arrived, and introduced a bill for the amalgamation of all the existing companies supplying the metropolis into one gigantic company, which was to be bound by the condition that it should draw its supplies from such sources only as the Home Secretary might direct. Another battle ensued both within and without Parliament, and when, on June 5th, 1851, Sir George Grey, on behalf of the Government, moved the second reading of the bill, it met with an extremely hostile reception. Mr. Cochrane, who moved by way of amendment that no bill for the supply of water for the metropolis should be proceeded with unless the works required for an improved supply were put up for competition on a contract for a number of years, objected to the bill as a piece of jugglery, arguing that it only transferred the existing monopoly of the companies to one larger company. The same course was taken by Sir Benjamin Hall; and Sir J. Johnstone, as the mouthpiece of the companies, protested against the amalgamation with such success that the bill was virtually shelved. Sir George Grey conceded that the existing supply was deficient and expensive, that competition was a sound principle, and that the control of the supply should, if possible, rest with the ratepayers, but he argued that competition had failed, and that peculiar circumstances prevented the due action of representative machinery in London. Sir George strongly defended the proposed amalgamation of the companies, and having agreed to refer the bill to a Select Committee, the strength of the Government was sufficient to carry the second reading by a narrow majority of five in a house of 183, the numbers being—for 94, against 89. This victory, however, was worse than defeat as far as the principle of the measure was concerned, and it was thus recognised by the Government, who modified the measure very considerably, so that when it was re-introduced by Lord Seymour on February 5th, 1852, the amalgamation scheme had entirely disappeared, and it was announced that the Government would seek to attain the end they had in view—the securing to the inhabitants of London water of a good quality, in sufficient quantity, and at a reasonable price—rather by sufficient control over private enterprise than by undertaking the supply themselves. At the same time an

independent measure was introduced by Mr. Mowatt for the organisation of a Water Supply Corporation, to be elected by the ratepayers, with four nominated members to represent the Government. After the introduction of Lord Seymour's bill, the result of the deliberations of the Select Committee on the bill of the previous session, over which Sir James Graham had presided, there was a change of Government, but the charge of the measure was taken over by the new administration, and on the 17th of June, on the motion of Lord John Manners, it passed through committee with but few alterations. The bill received the Royal Assent on July 1st, and as Act 16 Vict., cap. 84, it became law. Its principal provisions were (Clause 1) that no company supplying the metropolis should take water from any part of the Thames below Teddington Lock or from any part of the tributary streams within range of the tide; (Clause 2) that every stone reservoir within five miles of St. Paul's should be covered; by Clause 4 all water supplied for domestic purposes was to be effectually filtered, unless pumped from wells direct into covered reservoirs; and by Clauses 15 and 22 a constant supply of high pressure was to be given when demanded by four-fifths of the inhabitants of any district, on certain conditions being complied with by them.

After the passing of the Act the companies proceeded to carry out its principal provisions, expending about 2,500,000*l.* in works for this purpose, and in 1856 the Government appointed Professor Hofmann and Mr. Lindley Blyth to report on the effect produced on the quality of the water. These gentlemen reported that there was "a very considerable diminution in the amount of organic matter. In fact, in 1856 the waters supplied to the metropolis contained not more than one-half of the organic matter which was present in the year 1851, a result certainly not accidental, for the diminution was not merely an average result, but was uniformly observed throughout." This satisfactory change was attributable not merely to the removal of the intake of the water supply above the tideways of the Thames, but also to the improvement in the collection, filtration, and general management of the supply. At the same time the Committee insisted upon the importance of further inquiry into the removable sources of contamination of the Thames above the new sources of supply, and the inspectors recommended the introduction of the constant service system. Thus saved from amalgamation, but at the same time compelled to adopt every available

means to improve the quality of their supply, the companies were left in possession of the field.

Another turn was given to the consideration of the general subject of the quality of the water, by the appointment, in 1865, of a Royal Commission to inquire into the pollution of rivers, which issued its report upon the Thames in March, 1866. The Committee found evidences of contamination from sewage, but held that this sewage might be so utilized on land as to be rendered innocuous, and they recommended that the whole of the River Thames should be placed under the supervision of one governing body, who should, amongst other duties, take steps to free it from pollution. An Act was passed in August, 1866 (29 and 30 Vict., c. 89), altering the constitution of the Conservancy Board of the Thames, and requiring it to provide for the effectual scavenging of the surface of the river in order to the removal therefrom of substances liable to putrefaction, and rendering it illegal to carry into the Thames or into any tributary stream within three miles of its junction with the main stream any offensive or injurious matter. As a necessary complement to this Act, another statute was passed in August, 1867, to enable towns and villages to distribute sewage matter over land. In May, 1867, the Rivers Pollution Committee followed up its report on the Thames by a report on the Lea, which they found to be liable to pollution from sewage and from the refuse of manufactories, and they recommended improvements in its management. During the same session an application of the East London Waterworks Company for increased powers to draw 10,000,000 gallons a-day from the Thames at Sunbury led to a discussion; and an outbreak of cholera, which it was thought was partly attributable to water, induced the House of Commons to appoint a Committee not merely to examine into the East London Water Bills but to report generally on the results of the operations of the Act of 1852. This Committee, of which Mr. Ayrton was the chairman, held an exhaustive inquiry, and recommended the House to sanction the East London Company's application for permission to draw from the Thames, while it also expressed an opinion that the quantity and the quality of the water supplied from the Thames was so far satisfactory that there was no ground for disturbing the arrangements made under the Act of 1852; and that any attempt to do so would only end in entailing a waste of capital and an unnecessary charge upon the owners and occupiers of property in the metropolis. The water of the Lea they

found naturally not only wholesome, but comparing favourably with that supplied to other places. They agreed with the Rivers Pollution Commission that it was liable to serious contamination, and suggested certain alterations in the arrangements. On the importance of maintaining a constant supply, as well as of ensuring adequate care for the cleansing of house cisterns, the Committee insisted most strongly ; and they finally recommended that the Metropolitan Board of Works should be charged with the duty of seeing that companies fulfilled their obligations. An Act, carrying out the recommendations of the Committee as regarded the River Lea, was passed in 1868 (31 and 32 Vict., cap. 154).

The subject, as far as the metropolis was concerned, having thus been dealt with in a tolerably complete fashion, a Commission, with a far larger scope for its inquiries, issued on the 24th of December, 1866, to the Duke of Richmond, Sir John Thwaites, Colonel H. D. Harness, C.B., R.E., Alderman Phillips, Mr. T. H. Harrison, and Mr. Joseph Prestwich. The terms of the Royal Commission declared it "expedient to ascertain what supply of unpolluted and wholesome water could be obtained by collecting and storing water in the high grounds of England and Wales, either by aid of natural lakes or by artificial reservoirs at a sufficient elevation for the supply of the large towns, and to report, firstly, which of such sources are best suited for the supply of the metropolis and its suburbs ; and secondly, how the supply from the remaining sources may be most beneficially distributed among the principal towns." The Commissioners were empowered to call before them and examine witnesses, a course which they acted upon with the utmost freedom, and the evidence fills a massive blue book, the value of which is proved by the fact that, like the report of the Commissioners, it is now out of print, and can only be obtained at a very high price. In addition to their first instructions quoted above, the Commissioners were, in April, 1867, further ordered to inquire "whether there are other districts in addition to the high districts of England and Wales from which a good supply of unpolluted and wholesome water can be obtained." The Commissioners, after taking an enormous body of evidence, reported as to the quantity of water available from the Thames basin that "the river, supplemented if necessary by works for storing the flood-waters together with the River Lea, and the water obtainable from the chalk to the south and south-east of London, as well as probably from the lower greensand, would furnish a supply

sufficient for any probable increase in the metropolitan population;" and that "the abundance, permanency, and regularity of supply, so important to a large metropolis, are secured much more efficiently by the great extent and varied geological character of a large hydrographical basin, such as that of the Thames, than by the necessarily very much more limited collecting areas that can be made available on the gravitation system. In the former case, also, the supply-streams are self-maintaining, while in the latter the channel must be subject to the accidents incident to its artificial construction." On the quality of the water from the Thames basin the Commissioners expressed themselves in the following terms, which must be held to be as satisfactory to the general consumers as to the companies:—"As to the quality of the water from the Thames basin, we are of opinion that there is no evidence to lead us to believe that the water now supplied by the companies is not generally good and wholesome; that for drinking purposes the hardness of the Thames water is quite unobjectionable, and in no way prejudicial to health. The weight of evidence seems in favour of hard water as more free from certain dangers inherent in soft waters on account of their greater solvent power; that for cooking no important objection to the Thames water has been clearly proved, except as regards the deposit in kitchen boilers, which deposit is easily removed; that for washing and manufacturing purposes generally, soft water is preferable as more efficient and more economical, but there appears no means of expressing the amount of saving in a money estimate. Looking, however, to the fact that the hardness of the Thames water is moderate in degree, and is still further reduced by boiling, and considering also that the proportion of the whole metropolitan supply used for manufacturing purposes is exceedingly small, we cannot see that this advantage is of sufficient importance to render it necessary to go to a great distance for soft water; that the artificial softening process does not appear to be applicable to the Thames waters on a large scale; that perfect filtration is highly essential to the good quality of the water supplied; that this process is at present in many cases very imperfectly performed; and that more efficient means of enforcing the provisions of the law in this respect are required; that when efficient measures are adopted for excluding the sewage and other pollutions from the Thames and the Lea, and their tributaries, and for ensuring perfect filtration, water taken from the

present sources will be perfectly wholesome and of suitable quality for the supply of the metropolis. As to the quantity of water likely to be hereafter required for the supply of the metropolis, the Commission report as follows :—"We are of opinion that a probable increase of population to 4,500,000 or 5,000,000 may have to be provided for, though we believe that the time for such an extended provision will be very remote; that 200,000,000 gallons per day is the highest demand that need be reasonably looked forward to for the metropolitan supply; that the various companies are prepared, with only moderate additions to their present engineering means, to supply a quantity little short of this amount." As to the system of constant service, the Committee say :—"We are of opinion that the constant service system ought to be promptly introduced to the farthest extent possible in the supply of the metropolis; that it cannot be effectually introduced into London so long as the supply remains in the hands of private companies, to whom it would be inexpedient to confide the great powers necessary for the purpose." As to the general control of the water supply, the Commission add :—"We are of opinion that it is a matter of vital importance that an abundant supply of water should be provided for all classes of the population, as well as for general public purposes, street watering and cleansing, public fountains, and extinguishing fires; that for these purposes there should be a power of levying, as at Manchester, Glasgow, and elsewhere, two rates, one a special or domestic rate on all dwelling-houses, the other a public or general rate upon all rateable property; that no trading company could be permitted to levy or expend such compulsory rates, and that therefore the future control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of existing works, and for levying the rates referred to; that this plan offers the only feasible means of introducing efficiently the system of constant supply, and for securing a compulsory supply to the poor; and we believe that it would tend to economy, to the improvement of the quality of the water, and to ensure the proper provision for public objects and for extinguishing fires; and that it would increase the probability of beneficial results from the purification of the Thames." Finally, as to the supply of provincial towns, the Commissioners' conclusions were :—"That no town or district should be allowed to appropriate a source of supply which naturally and geogra-

phically belongs to a town or district nearer to such source unless under special circumstances which justify the appropriation; that when any town or district is supplied by a line or conduit from a distance provision ought to be made for all the places along such line; that on the introduction of any provincial Water Bill into Parliament, attention should be drawn to the practicability of making the measure applicable to as extensive a district as possible, and not merely to the particular town." The Commissioners in their report also pronounced strongly against the schemes which had been put before them for obtaining water from the mountainous districts of England and Wales for the metropolis. Mr. Bateman's scheme for collecting water by reservoirs to be formed in the mountainous districts of North Wales, and conveying it by artificial conduits to London, would, the Commissioners estimated, require an outlay of about 11,000,000*l.*; but apart from this, and from objections to the quality and colour of the water, there would be great danger in placing such a population as that of London in dependence on a distant supply which might easily be stopped by any one of several causes, such as wilful damage, frost, or the failure of work along the line. The collection of such vast bodies of water in artificial reservoirs at the head of so important and populous a valley as that of the Severn would also be dangerous, even though with competent engineers and ample funds the risk of rupture might be reduced to a minimum. The plan of Messrs. Hemans and Hassard for supplying the metropolis from the lakes of Cumberland and Westmoreland; that of Mr. Hamilton Fulton for drawing upon the upper sources of the Wye in Mid-Wales; and Mr. Remington's plan for bringing water from the hills of Derbyshire and bringing it from Mill Dale on the River Dove by a conduit 135 miles long to a reservoir on Barnet Hill, were all considered and objected to on the same grounds; while Mr. Dale's plan for supplying Yorkshire from the Cumberland Lakes they also regarded as a mistake, first, because it was needless, there being an ample supply nearer at hand; and, secondly, because it should, if used at all, be used for the neighbouring manufacturing districts. It will thus be seen that the general verdict of the Commissioners was in favour of a more perfect utilization of the rivers near London for the metropolitan supply, and on all grounds adverse to any attempts to obtain water from distant sources, except in cases of necessity.

The valuable and exhaustive report of the Commissioners

had, as Lord Shaftesbury complained in 1871, lain for a long time upon the table before any action was taken upon it, but in that year, after the introduction and withdrawal of one measure, another (34 and 35 Victoriæ, c. 113) was passed, providing for a constant supply on Sundays as well as on other days, by all metropolitan companies, and enabling local bodies to demand such a supply, and to appeal to the Board of Trade in the event of negligence. Power was also given to the Board of Trade to appoint persons to inquire into and report upon the quality of the water. This latter provision was acted upon, and we learn from the reports of the officers appointed that the companies are taking active steps to afford the constant supply required by the Act above named. Much, however, still remains to be done in this direction, and it rests with the public to see that the benefits which under the Act they have a right to demand are supplied not only to the houses of the rich but to the cottages of the poor.

Of vital importance to the consumer is the question of the quality of the water supplied, and on this point we have information brought down to the close of the year 1877 in the analytical reports by Professor Frankland, D.C.L., F.R.S., of the Royal College of Chemistry. During the year London was supplied by eight companies—the Chelsea, West Middlesex, Southwark and Vauxhall, Grand Junction, Lambeth, New River, East London, and Kent—with an average daily volume of 120,864,496 gallons of water. Of this the Professor states, that 60,862,201 gallons were sometimes much polluted with sewage matter; 52,771,302 gallons were occasionally so polluted, but to a much less degree; and 7,230,993 gallons only were of unexceptionable quality. Although the year 1877 was very favourable for river water, nevertheless, in January, April, and December, the Thames water was delivered to consumers "in such a polluted condition as to be utterly unfit for dietetic purposes." Even with this unpleasant revelation before us, it is satisfactory to note that an improvement is taking place for accepting the mean proportion of organic impurity in the Thames water delivered in London in 1868 as 1,000, the Professor reports that in 1876 it had fallen to 903, and in 1877 it was 907. This improvement can be shown to be distinctly attributable to the more careful treatment of the water by the companies. The water taken from the Lea was as usual far less contaminated than that in the Thames, and taking the mean of the Thames as 1,000 that of the Lea was 596 in 1877.

The following table exhibits the maximum amount of organic pollution in Thames and Lea waters from 1868 to 1877 inclusive, the average of the samples from each source in the month of greatest pollution being taken for comparison.

Thames.			Lea.		
Year.	Elements of organic matter in parts per 100,000.	Month in which maximum pollution occurred.	Year.	Elements of organic matter in parts per 100,000.	Month in which maximum pollution occurred.
1868	·45	January.	1868	·27	February.
1869	·60	February.	1869	·33	February.
1870	·42	January.	1870	·30	January.
1871	·52	October.	1871	·22	February.
1872	·48	January and December.	1872	·39	December.
1873	·46	January.	1873	·33	January.
1874	·37	March.	1874	·21	March.
1875	·49	November.	1875	·28	November.
1876	·44	December.	1876	·24	March.
1877	·40	January.	1877	·30	January.

The improvement exhibited in the quality of the Thames water is, the Professor considers, to be attributed almost wholly to the more careful treatment of the water by the companies; for if the comparison be made with that portion of the Thames water which was distributed by the Southwark Company, the maximum amount of organic impurity is no less than ·47 in January, 1877. In reference to the proportions of organic elements in the foregoing tables, the following opinion of the late Rivers Commissioners from their report on the Domestic Water Supply of Great Britain, p. 5, is of interest :—"We consider that potable water which contains organic matter, even only partially derived from animal sources, should not yield much more than ·01 part of organic carbon in 100,000 parts of water." As the organic elements mentioned in the foregoing table consisted chiefly of organic carbon, it will be seen that the maximum pollution in the Thames greatly exceeded this standard, whilst that of the Lea was also always considerably above it. Of the waters supplied from the Thames, that delivered by the West Middlesex was the best, and that distributed by the Southwark Company the worst. Of the water drawn from the Lea by the New River and East London Companies, that supplied by the former was the best. Professor Frankland pays a high tribute to the quality of the water drawn from deep wells by the Kent and Colne Valley Companies and by the Tottenham Local Board of Health, which he says was so excellent as to render comparison super-

uous. It is, he argues, "very desirable, both in the interests of temperance and of public health, that this delicious water should, as soon as possible, be substituted for that portion of the metropolitan supply which is drawn from polluted rivers. This spring water, of unsurpassed purity, palatabiiity, and wholesomeness, is everywhere abundant in the Thames basin. In dry seasons it constitutes the sole supply of the river, and, even after the most protracted drought more than 350,000,000 gallons of it flow over the weir at Teddington, whilst a further large volume of it joins the Thames lower down. Surely it cannot be beyond the powers of Parliament and engineers to collect and preserve from irretrievable sewage pollution a small fraction of this prodigal supply, and to distribute it to those portions of London which at present drink it after it has been mixed with the sewage of more than half a million of people." The natural filtration which the Kent, Colne Valley, and Tottenham deep well water undergoes through an enormous thickness of chalk renders artificial filtration unnecessary, and is the cause of its almost uniform clearness and transparency. The West Middlesex and East London Companies only, out of the seven which supply river water to London, uniformly delivered it in an efficiently filtered condition in the past year. At the same time, the Professor adds, that since the year 1868, when he first instituted these observations, the filtration of the river water has undergone great and continuous improvement. Thus, during the year 1868, seven samples of water were very turbid when drawn from the mains; in 1869 six samples were very turbid; four in each of the years 1870 and 1871; in 1872 only one sample was very turbid; in 1873 none; in 1874 the Chelsea Company's water reached that degree of muddiness on two occasions, but since that date no sample was drawn in a very turbid condition from any main in the metropolis, until one was furnished by the Southwark Company during the past year. During the year 1877 living organisms were observed in the Chelsea, Lambeth, and New River Company's water once, in the Southwark Company's water five times, and in the water of the Grand Junction Company three times.

As this article is passing through the press the Metropolitan Board of Works has resolved to apply again to Parliament for powers to assume the control of the water supply of London, and thus the whole question is likely to be brought once more into the region of "practical politics." CHARLES MACKESON.

PUBLIC ACCOUNTS.

ALL accounts, whether we take the cash book of a country grocer, or the balance sheet of a nation, are by their nature twofold, and divisible into two great sections, mutually affecting each other. These two great divisions may be described in several ways—income and expenditure; debits and credits; charge and discharge: in taking the short survey of our system of Public Accounts which is intended in this paper it will be convenient to use the first-mentioned pair of terms as principal divisions of the subject, and to consider the matter shortly on the two main lines of Income and Expenditure. Incidental to both of these great cardinal divisions, in any great system must be other branches, such as for instance pertain to the custody and issue of moneys, or banking accounts; while another, and perhaps the most important, matter in connection with all accounts, public or private, is the all-essential question of audit.

The *Income* of the English Executive—a very different thing, of course, from the income of the English nation—is that part of the wealth of the nation which is set apart by itself for carrying out the various purposes of Government, and handed over, for those purposes, to the Crown, as the head of the executive staff, and chief agent of the people. That the people of this country tax themselves, and cannot be taxed except by themselves, through their representatives in Parliament, is a principle familiar to all of us; and much of the pages of our works on constitutional history is devoted to tracing the assertion and growth of this principle. No great discernment is needed to see that in self-taxation is involved national liberty; for no people can be free who have a master with power to appropriate their property without their leave. That in past times the Crown gathered taxes by force, without consent of the taxed, is well known to the student of history: he will also be familiar with the fact that the effort on the one side to retain and exercise the power of taxation without previous consent of the taxed, and on the other to resist all exactions by the Executive of Revenue to which previous consent had not been given by those who have to pay, underlay nearly all the quarrels between Crown and people which marked the past periods of English history.

The result of the long struggle is that, in the present day, not a penny is disbursed by the English Crown and its officials—

conveniently termed the Executive—which is not first granted, for expressed and defined purposes, by the English people through its representatives; and that the right, not only to grant and refuse "supplies," but to know, before considering a grant, for what purpose every shilling asked for is required, and to know also, after a grant has been expended, in what way every shilling has been spent, has been clearly admitted and unassailably established as the basis of English public finance. Thus a complete system of Public Accounts may be regarded as a corollary of the constitutional principle of self-taxation.

Accordingly, as between Crown and Parliament, our system of Public Accounts has for its object to ensure that the exact detailed intentions of Parliament, both as regards the derivation of public income and the distribution of public expenditure, are carried out: it has also, of course, the subordinate but not unconnected objects of ensuring arithmetical accuracy, and of enforcing the exact accountability of disbursing officials. This last is primarily a matter between the Executive and its money-receiving and money-disbursing agents: the first-mentioned object of a system of Public Accounts being, as stated above, a matter between Crown and Parliament.

The first stage of Public Accounts may be said to be within the walls of Parliament itself, where the income of the Executive is voted, in various forms, and under more or less strict definition. It is the business of the Chancellor of the Exchequer to state, every year, to the House of Commons, what sums he considers will be requisite for carrying on the government of the country, and to propose to the House the various ways and means by which those sums shall be raised. This statement, familiarly known as the Budget, is based on confidential estimates supplied by the revenue departments. It is of course only a proposal, which Parliament may modify or reject as it pleases: in the end, however, the exact form which taxation shall take, for the purpose of ensuring a sufficient revenue for administrative uses, is agreed upon; "supply," as the technical phrase runs, is "granted to Her Majesty;" in other words a public income is provided for the "financial year," which, for the obvious convenience of Parliament, begins on the 1st of April in any one year and ends on the 31st of March in the next.

Outside Parliament, the functions of a system of Public Accounts on the income side are first to ensure the correct accounting for income gathered; secondly, the record of public income

under the heads formulated and proposed by the Chancellor of the Exchequer, and discussed, modified, and finally settled by Parliament.

The public Income of the English Executive is comprised under the following principal heads:—Customs, Excise, Stamps, Taxes, Post Office; and of these the second, third, and fourth are known in the aggregate as *Inland Revenue.*

The term *Customs*, anciently applied to "customary" payments made to the Crown as dues of various kinds, is now, by use, restricted to duties on imports of goods; and these dues are no longer "customary," but are defined, and frequently altered, by statute. In early times the Customs were farmed; it was not till 1671 that their collection was transferred to Commissioners, and the record of the exact receipts made a function of the Public Accounts. The receipt and account of Customs duties remains, as is familiarly known, in the hands of Commissioners of Customs.

The task of collecting and accounting for the income from excise and stamps, and of what are known, in the more limited sense of the word, as taxes, was assigned, up to 1833, to three separate Boards: in 1834, stamps and taxes were placed under one Board; in 1849, the management and accounting for excise, stamps, and "taxes," were united under one body, the Commissioners of *Inland Revenue.* The financial officer of this Board, the Accountant-General of Inland Revenue, is, as may be imagined, the most important accountant officer on the receipt side of the national staff of public accountants: with him rests the duty of securing the due rendering of that branch of the Public Accounts which shows the produce of the greater part of our taxation.

Of the several species of Inland Revenue the *Excise*, one of the principal, consists of duties on manufactures and sales of certain articles within the kingdom. Imposts of this sort grew up in feudal and immediately subsequent times, but first began to be made the subject of definite Parliamentary action during the Civil War. Both the Parliament and King Charles I. levied it. Then, in the reign of Charles II, half the revenue of Excise was settled upon the Crown as hereditary income, and half was granted to the King for life; such was the then imperfect appreciation of the duty of Parliament in regard to the imposition of taxation. Even in that day, however, there was a lively sense of the power parted with by conferring upon the Crown a per-

petual right to the produce of taxation; the "hereditary excise" was only carried by 151 votes to 149, and of course it did not long survive the prevalence of sound constitutional ideas. Excise, like the Customs, was frequently farmed; much, no doubt, to the simplication of any public account which might be required thereof. Commissioners of Excise subsequently took the management, and rendered the accounts till, as already recited, the administration of Excise was united with that of the stamps and taxes.

Stamp Duties are another branch of Inland Revenue of which the nature is familiar, and the name arises from the impression of a seal or other mark on the articles, chiefly documents, upon which, as a convenient method of raising revenue, fees were imposed. The Stamp system, however, may be regarded rather as a method of collection than a distinct kind of duty; it ensures the collection of the tax involved in advance, and by the sale of the stamp; and it must here be noted, as a point in any accurate conception of the system of Public Accounts, that although all stamp duties are collected by stamps, all revenue collected by stamps is not included under the technical head of Stamp Duties. The Post Office revenue is partly collected by stamps, but is made the subject of distinct account, and separate administration, with which the Inland Revenue Department does not interfere; though it may be noted that the actual manufacture of all stamps, whether for the purposes of the Post Office, Telegraph Service, Courts of Law, or Inland Revenue, is placed by statute under the sole control of the Board of Inland Revenue and its officers.

Taxes, in the limited and technical sense of the term as used in the Public Accounts, are direct duties on persons or lands, as distinguished from indirect levies upon articles of use and consumption. From the time when these appeared in the form of Fumage or Hearth Money, or a tax upon fireplaces and stoves, to the period when they were consolidated into their present shape as Land Tax, Inhabited House Duty, and Income Tax, this branch of the public revenue has a history not without great interest for the curious; but which it is impossible to trace in the space at present at disposal.

Of the duties of the important financial officer already mentioned, the Accountant-General of Inland Revenue, one branch is, of course, the detailed examination of the numerous accounts rendered by the body of Collectors of Inland Revenue who are

stationed at important points all over the United Kingdom, in the same manner as Collectors of Customs are stationed at the various ports. As an example of the machinery by which the revenue is collected and accounted for under the direction of this officer, may be quoted the method in use in regard to Excise. The amounts payable to the Crown by the various manufacturers, and others upon whom these duties fall, are first ascertained by Surveyors, familiarly known as Excise Officers. These officials raise "charges," as the term is, against the several traders, which are sent in to the Accountant-General of Inland Revenue, every six weeks, certified by the "Supervisor of Excise" for the district concerned. At the same time is sent to the local "Collector of Inland Revenue" a statement showing the amounts he is to collect from the several individuals resident in his "collection." At dates fixed beforehand, and made known by the Excise Officer to the traders chargeable, the Collector, going on his "rounds," is at the principal towns to receive the amounts of duties. The Collector is joined at these fixed centres by the Excise Officers who have raised the "charges" upon the traders, and as the money is paid, the Excise Officer for the district certifies to it. If the collection is a large one, facilities are given by the Bank of England, by sending a clerk, either from London or from the local bank acting as its agents, for the remittance to London of the amounts received. The moneys received by the Collector are paid over to the Bank of England clerk, or into the local bank acting as agent for the Bank of England, and a receipt is given to him in duplicate, one copy of which is retained by the Collector, and the other forwarded to the Receiver-General at Somerset House, the Accountant-General—also at Somerset House—being at the same time advised. On receipt at head-quarters of this document, a charge is raised in the office books against the Bank of England for the amount paid to the clerk or local agent of the Bank, and a corresponding credit is given to the Collector of Inland Revenue. The Bank of England, which is advised by its own officers or agents in the provinces of the sums paid over to them, credits the public revenue day by day with a round sum in the accounts it keeps for the Government as custodian of its money; the actual balance due to Revenue being ascertained, and an accurate adjustment made, periodically.

The machinery of account by which the collection of Excise is checked is as follows: The Collectors render cash accounts to the

Accountant-General of Inland Revenue eight times a year, that is to say, about every six weeks, that being the period of a "round" of collecting. These accounts show the aggregate amounts "charged" in the collection under each head of duty; the amount received in respect of such charges, and the amounts outstanding or uncollected at the close of the period of account. The "charges" are verified by the independent returns furnished to the chief office by the Officers of Excise before referred to, the amounts outstanding being also checked by returns under the signatures of the proper officers and Supervisors of the several districts in the collection. Thus independent officers furnish the means to the head office of auditing the Collector's receipts, that is, of seeing that he accurately debits his accounts with the sums he has actually received. The disbursements made by the Collector on account of allowances out of revenue, or in respect of charges of collection and management, are supported by vouchers which undergo minute and critical examination at the chief office.

Stamp Distributors' accounts are also rendered to the chief office of Inland Revenue at Somerset House. These consist of two kinds, cash accounts and stock accounts, both rendered monthly. The stock accounts are accounts of the stock of stamps. Distributors obtain stamps for sale direct from the Comptroller of Stamps and Stores at Somerset House; these are debited in his monthly "Stock Account," and on the credit side he shows the amounts received for stamps sold. Such accounts, of course, are easily checked at head-quarters. It is known by the Comptroller of Stamps and Stores what stamps he has sent to the Distributor; the latter remits the moneys received for sales, and his balance on the monthly account is the stock of stamps still in his hands. The stock in hand is verified quarterly, or at such other times as the Board of Inland Revenue may direct by an officer from the department in London.

Taxes are for the most part collected by persons not in the Government service, who are appointed by the Local Commissioners of Taxes. An assessment against each parish having been made, a duplicate of the assessment is prepared by the Clerk to the Commissioners of Taxes, and delivered to the Collector, who is then in a position to commence his collection at the appointed time. The amounts collected by the parochial collector are paid over by him from time to time to the Collector of Inland Revenue upon pay-tickets furnished by the Surveyor of Taxes for the district, who on behalf of the revenue, and in conjunction

with the clerk to the Commissioners of Taxes, sees that the parochial collector makes due progress with and accounts for the full amount of his collection.

A charge against each parish is kept at the chief office, the parish being debited with the amount of the assessment made upon it, and credited by the cash paid over by the local collector, and by sums certified by the Local Commissioners to be irrecoverable.

Such are the accounts by which are ensured the correct collection and paying over of the principal items of Inland Revenne. It will be easily granted that the final supervision of this and the rest of the similar machinery of which the oversight is assigned to the Accountant-General of Inland Revenue constitutes a very important function connected with Public Accounts. For the other branches of public income a briefer survey must suffice.

Post Office revenue began, of course, with the beginning of a system of public letter carriage, which was in the reign of James I. But, like other revenues, this was farmed at first, and required no special system of bringing to account. Farming was continued, as regards the bye-posts, up to the commencement of the eighteenth century. From 1685, however, the accounts of Post Office revenue exist in an unbroken series. They are controlled by a financial staff in London in a manner analogous to that in existence in the Inland Revenue Departments. Telegraph revenue is a modern addition to the subjects of account in this department, the finance of which has not been altogether above criticism.

The above described, though the main, are not the only heads under which public revenue accrues and public accounts of income have to be rendered. The head Crown Lands forms not only an important additional item, but one which has occasioned special trouble in connection with Public Accounts. In 1848 a select committee of the House of Commons investigated the subject; and since 1848–9 accounts of Crown Lands have been kept on the new and only proper method which resulted from the inquiries of this committee.

Numerous other items of income find separate place in the Public Accounts, and one of the most curious of these is Conscience Money, or voluntary remittances for conscience sake, generally anonymous. The amount so received is sometimes larger than appears under the head in the Public Accounts, as remittances are not infrequently made to the Inland Revenue

Department with an intimation that they are for a certain specified tax omitted to be paid. In such cases the amount is carried to the head of revenue specified; but all "conscience money" sent to the Chancellor of the Exchequer, whether stated to be due under any special head of revenue or not, is carried to the head of "Miscellaneous Revenue—Conscience Money."

Having now shown in brief the process of recording and accounting for the detailed collection of Public Income, by the numerous collectors, it is next to recite the process by which the custody and issue of Public Moneys is made subject of account.

From the time of the Norman Conquest the receipt of public revenue was entrusted to the connected offices of the Exchequer and the Treasury. The keeping of Public Accounts, so far as concerned this branch, was assisted in these ancient times by the use of a table covered with a cloth marked with chequers; these served to help the tellers in counting; and hence the name Exchequer. The Treasury department of the same group of offices was more directly concerned in the custody of the revenue, and its issue for the uses of Government. The Exchequer was anciently divided into two sections, the Lower Exchequer, or Court of Receipt, and the Upper Exchequer, or Court of Account. The Chancellor of the Exchequer was originally appointed as a check upon the Treasurer; and as regarded audit—of which much more must be said presently—it was internal only, and in no sense Parliamentary. Accounts were kept, by these ancient offices, partly by means of wooden tallies, of about the size and shape of the gardeners' labels stuck in flower-pots, with notches cut in their sides, and marks in a peculiar Norman-Latin jargon. Wooden tallies only gave way to written receipts in the Public Accounts, in the year 1826! The survival so long of such antiquated details, however, was a matter of little consequence as compared with the existence, at the root of Public Accounts during all this period (and, in some measure, it will be seen up to the present time), of the practice of the Crown, in some form or degree, auditing its own application of Parliamentary grants. Partial reforms were made, having for result to make more distinct the functions of the several officers, and thus to ensure better accounts; amongst these may be mentioned the appointment, in 1834, of a Comptroller-General of the Exchequer, who was invested with certain of the powers formerly exercised by the Auditor, Tellers, "Clerk of the Pells," and such-like functionaries of the Exchequer. At the same time a mass of busi-

ness connected with detailed payments, formerly made at the Exchequer, was transferred to another new officer, the Paymaster of Civil Services. This last-named office, obviously an incomplete one, was converted a few years after into that of the now existing Paymaster-General, to whom was assigned the duty of making detailed payments, not only for civil services, but also for all the military and naval services of the State, besides functions of public account to be hereinafter shortly stated.

The great step of modern times by which Public Accounts have been placed upon a better footing took place in 1866, after an inquiry which began ten years previously. In 1856 a select committee of the House of Commons was appointed to inquire into the mode of receipt, issue, and audit of Public Moneys, Sir F. Baring being the chairman. Their report was not favourable to the then existing system of entrusting the control of receipts of public money, and its audit, to the Exchequer, in other words the Crown; and as a result—though an imperfect one—the then existing offices of Audit and certain powers of the Exchequer were combined in a new department called the Exchequer and Audit Department. This, it will be seen, was a great step towards a healthy organisation of Public Accounts. But before entering upon the vital question of audit in regard to Public Accounts, it will be desirable to mention the principal accounts of *Expenditure*, which, like those of Income, must of course be such as will admit of audit, and that with reference not only to accuracy but also to correct application.

The national expenditure embraces the following chief heads :— Interest and Management of Public Debt, Civil List, Annuities and Pensions, Salaries and Allowances, Courts of Justice; and besides these and some others, what are called the Voted Supply Services, of which the principal are the army and the navy, and the cost of the collection of revenue. In expending the money voted by the nation under all these heads, each department concerned employs its accounting officers, of denominations too numerous to catalogue here, and each department has its staff of clerks for examining the accounts which its agents render, and reducing these into the form necessary to their absorption into the finance accounts and accounts of appropriation, which are rendered for the information and satisfaction of Parliament.

The principal Public Accounts indeed are not those of the agents of departments, collecting or spending, rendered to the

general head-quarters : these all lead up to what are called the *Finance Accounts*, or the great general statement of the finance of the United Kingdom which is rendered yearly by the Treasury to the nation through Parliament. It is with a view to the preparation of these grand central statements of income and expenditure that many of the arrangements in regard to public accounts are made : accordingly it will be convenient to state briefly, at this point, what is their nature.

The Finance Accounts for 1877–78 form a volume of about 100 pages, in which the entire Income and Expenditure of the nation for the year is classified and set forth first under its main heads, in the form of a cash account, showing the whole of the receipts into and the issues out of the Exchequer in the financial year, and the balances in the Exchequer at the commencement and termination of the year ; and secondly in detail at a length and with an accuracy only to be appreciated by perusal. This and most other documents relating to the Public Accounts are to be obtained at any Parliamentary booksellers for a trifling sum ; so that the means of knowing and criticizing the public income and expenditure in reasonable detail is open to all.

Intermediate between Income and Expenditure, as already mentioned, comes an element of Public Accounts which is not without its complexity and its interesting features, the *Banking* of public moneys, the arrangements in regard to which must not only provide for the ordinary business transactions of receipt and disbursal, but also be designed to admit of the proper rendering, under all their numerous heads, and with all their complexities, of the just recited finance accounts, and the record of expenditure under the several grants. The banking business of the English Executive is done by two great establishments (reckoning the Banks of England and Ireland as virtually one), namely, the Bank and the Paymaster-General's Office.

It will have been seen, from the description given of the arrangements for collection of Excise, in what manner the produce of taxation, in that case, finds its way into the Bank of England. The rest of the public revenue finds its way there by analogous arrangements which need not be separately detailed ; if the various Government offices, as necessary incidents of departmental business, receive money themselves, it is in comparatively small sums ; and those sums are transmitted to the Bank by the department. No part of the revenue is now, as it was formerly, diverted from the Exchequer by deducting expenses of

collection : these are, in our existing system of Public Accounts, provided for separately, and made the subject of a "supply vote" by Parliament.

So far as receipts are concerned, it must be observed that money is not received on Government account at the Bank of England, or the Bank of Ireland (which performs in the sister island the same functions for the Government as the establishment in London), without a standing authority, or a special authority technically known as a "Receivable Order." These latter are issued by the particular Government office concerned with the amount to be paid in ; and particulars of them are communicated to the Paymaster-General's Office. When a debtor or collector to the Crown pays in the amount he owes, or has collected, at the Bank, he leaves with the money the receivable order ; and the receivable orders are passed on to the Paymaster-General, who is thus made acquainted with the account to which the receipt is to be credited.

The principal moneys received at the Bank for the Government are, of course, those collected by the Customs, Inland Revenue, and other offices which gather taxes. Amounts collected from the taxpayer and paid in by these departments under arrangements already recited are credited to the several departmental accounts of receipt ; these are emptied, by daily transfers, into the great central account called the Exchequer. When once revenue has been paid over to this great account it cannot be recalled or touched in any way by the collecting department ; it becomes available for all the several purposes of Government ; and is applied to these several purposes by the requisite amounts being placed from time to time to the credit of the Paymaster-General in the books of the Bank, to enable him to meet the detailed demands of the departments. Only the Treasury can direct issue of money from the Exchequer. The Paymaster-General has at the Bank of England there great accounts, a Cash Account, a Bill Account, and a Drawing Account ; and through these, which are fed by the Bank, on Treasury Warrant, from the Exchequer, he finds the means of making all the large and numerous payments which he has to make as the great national Cashier, either by money payments direct, by honouring bills drawn upon him by other officials for their various purposes, or by issuing cheques on the Bank of England.

Besides being what the name implies, an officer by whom most payments of public money are either actually made or

authorised to be made at the Bank of England, the Paymaster-General acts as a great central "clearing-house" for the Government Offices, and, upon proper instructions from both of any two departments concerned, transfers sums from the account of the one to the account of the other, in solution of the very numerous claims of one office to be recouped for expenditure incurred on the service of another, which are necessary incidents of public transactions. In this way, as between bankers, the various departments adjust accounts with each other without cash actually passing.

Over all this business of receipt and disbursal, which has been roughly sketched in the foregoing pages, and to state which in full would occupy a volume, there are two great supervising bodies, the Treasury and the Exchequer and Audit Office. Briefly, it may be said that the first of these controls in the interest of the Executive, and the latter supervises in the interest of Parliament as representing the great body of taxpayers.

We now arrive at what is perhaps the most vital part of a system of Public Accounts, and that which has the most important constitutional bearings,—namely *Audit*.

For next after the great constitutional principle of the nation taxing itself, and granting "supplies" to the Executive of its own free will, is the principle of the right of the nation, through Parliament, to see that the supplies granted are properly applied. Not merely, that is, that the money is actually accounted for as spent or remaining on hand, but that what is spent is applied to the exact object for which it was voted. Were this not seen to, there would obviously be opportunity for such abuses, by diversion of funds granted, as would go far to render nugatory the control of supplies. Parliament, for example, being always willing to vote money necessary for the army or the navy, might be asked by the Executive for much more than was required for these services; and large sums might be spent, to take an extreme supposition, on some unpopular public work. In practice such a glaring misappliance would scarcely take place; but less palpable diversions of public money might easily occur in the absence of a careful provision for the prevention of such irregularities. Accordingly a large section of Public Accounts' machinery exists of which the sole purpose is to ensure the correct "appropriation" of the various sums granted to the Executive by Parliament, and ot ascertain that the departments have used what is voted not merely for *a* proper purpose but for *the* proper purpose. It has

been said that the British Constitution is founded upon the principle of distrust of the Executive: certainly this is the principle upon which, and that rightly, the greater part of our Public Accounts' system is founded.

There are stages, preliminary to that of actual audit, at which, in the administration of Public Accounts, the principle of insuring correct appropriation of supplies finds play. The first of these is in the framing of *Expenditure Estimates.* To admit of a subsequent appropriation audit it is, clearly, necessary that the purposes for which moneys are voted should be clearly and carefully defined. Unless the purpose of a grant is made clear, it is impossible to see that the disposition of the money is correctly carried out. Accordingly it is part of our system of Public Accounts that careful and detailed estimates should, in all cases, be laid before Parliament before a supply of money is asked for. The preparation of these forms a section of the work of most of the Government offices; and in the great spending departments, the Estimates are printed documents of great length and complexity. Let us take, as an example, those of the Navy. These are prepared at the Admiralty during the late autumn and winter months, and an amount of care is required for their calculation, classification, division and subdivision which would not easily be credited were the results not palpable in the annual printed paper, by which their every detail is made accessible not only to members of Parliament but also to any person who may care to expend a shilling or two on the purchase of the document at a Parliamentary bookseller's.

The Navy Estimates for 1878–79, the document, that is to say, in which the Admiralty made known to Parliament the total and the particulars of what funds it considered necessary to be granted to the Queen for the naval service of that year, is a volume, blue-book size, of 251 pages. These requirements are classified under seventeen "votes," which are the grand divisions under which the money is proposed to be granted by Parliament, and to be subsequently accounted for: a preliminary table shows the increase or decrease on the corresponding vote for the next previous financial year. Besides this major classification, each "vote" is set out under "sub-heads" distinguished by letters of the alphabet: for instance, Vote 6, for "Dockyards and Naval Yards at Home and Abroad," has sub-heads extending from A to S, set out as follows :—

	1878-79.	1877-78.	Increase.	Decrease.
	£	£	£	£
A.—Salaries and Allowances, Dockyards at Home..	111,436	109,975	1,461	
B.—Rents, Water, &c. . .. .. ,, ..	4,785	3,911	874	
C.—Gas .. .. ,, ..	7,500	7,250	250	
D.—Contingencies .. .. ,, ..	4,323	4,360	..	37
E.—Wages to Artificers, &c. .. ,, ..	1,015,102	1,014,829	273	
F.—Wages, &c., Yard Service Afloat .. .. ,, ..	27,816	28,444	..	628
G.—Hire of Teams .. .. ,, ..	10,284	10,284		
H.—Wages, &c., Police Force, ,, ..	31,445	31,486	..	41
I.—Extra Pay to Artificers, &c., of the Fleet Dockyards at Home	250	250		
K.—Salaries and Allowances, Naval Yards Abroad ..	42,553	40,876	1,677	
L.—Rents, Rates, Water, &c. ,, ..	766	701	65	
M.—Gas .. .. ,, ..	580	480	100	
N.—Contingencies .. .. ,, ..	1,110	1,110		
O.—Wages to Artificers, &c. .. ,, ..	71,405	67,170	4,235	
P.—Wages, &c., Yard Service Afloat .. .. ,, ..	7,449	7,278	171	
Q.—Hire of Teams .. .. ,, ..	718	723	..	5
R.—Wages, &c., Police Force.. ,, ..	10,238	10,173	65	
S.—Extra Pay to Artificers, &c., of the Fleet, Naval Yards Abroad	2,380	2,380		
	1,350,140	1,341,680	9,171	711

Actual expenditure in 1876-77 .. £1,339,243
Net increase £8,460

This reprint of a single page in the Naval Estimates will give some idea of the pains taken, as a necessary preliminary to proper Public Accounts of Expenditure, in defining exactly what Parliament is asked to grant the Executive: it exhibits however only *one thirty-fourth part* of the explanatory and defining detail actually afforded by this one department alone, the statements which follow the table extracted above occupying some 34 pages, in which the most minute details are set forth, with, in every case, the increase or decrease as compared with the preceding year, duly shown for the guidance of our representatives who are asked to vote the money.

Similar detail is afforded by the Army Estimates; and more voluminous still are the Estimates for Civil Services, which, for 1877-78, occupy a volume of 596 pages: these are divided into seven classes, each class into numerous "votes," and each "vote" is set forth in detail, corresponding to that exemplified in the quotation just given from the Navy Estimates. The estimates for the management and collection of revenue, as framed by the Customs department, the Inland Revenue authorities, and the Post Office, extend over 100 pages of printed matter; and are the

result of carrying out the important principle already mentioned, that revenue is not to be diverted, on its way to the Exchequer, to defray costs of collection, but payment of these, as for other services to the Crown, must be the subject of Parliamentary grant, and distinct account.

It will be easily conceived how important and useful is all this elaboration, first as a preliminary to Parliamentary action in granting, or refusing, or reducing, the supplies asked for by Ministers on behalf of the Crown; and, secondly, as a necessary means of rendering possible an effective "appropriation audit." With the first of these uses of estimates most readers of the newspapers are dimly familiar: few persons, probably, follow with much interest the detailed criticisms which arise in "Committee of Supply;" but it is clear enough, even to those of us who do not care to follow assiduous members into their many objections and queries, that the means of taking objection and of putting effective queries, is afforded Parliament in plenty by the documents presented to it as a basis for a vote of money. On the occasions when these details are discussed there are seldom many members present, but upon each section of the several estimates upon which the House takes action during a session a small knot of experts will usually assemble; at one time one set of men, at another time another set, according to the subject. Thus in the light of the details supplied by "Estimates," every part of a vote of supply asked for is sure to be scrutinized, and sometimes an item is modified, perhaps withdrawn, by the department of the Executive which has asked for the money, in consequence of the examination to which it is subjected. In the end the exact intentions of Parliament are registered in the most definite possible form, with respect to literally every pound sterling of supply granted, and a basis is thus laid for absolute accuracy in the accounts showing the appropriation of public money.

Having before it all this information, Parliament gives formal sanction to the expenditure it considers necessary by passing, every year, what is termed an "Appropriation Act." This is usually preceded by one or more Acts, granting sums of money on account, and the "Appropriation Act," passed later in the session, enumerates and consolidates the previous grants.

Thus in the session of 1877, to take a recent example, the first Act passed was one to grant the Queen 350,000*l.* out of the Consolidated Fund, with power (necessarily and usually given in

these cases) to the Treasury, to borrow to that extent at interest not exceeding 5 per cent. Similar grants were made by caps. 6, 12, and 24 ; the Appropriation Act itself is cap. 61, which, after granting a further sum of 14,938,668*l.* to the executive, proceeds to prescribe the "Appropriation of Grants," which is expressly done by clause 3, as follows :—

"All sums granted by this Act, and the other Acts mentioned in "Schedule A to this Act" (these are the previous grants of supply already referred to) "out of the Consolidated Fund towards "making good the supply granted to Her Majesty, . . . are "appropriated, and shall be deemed to have been appropriated, "as from the date of the passing of the first of the Acts mentioned "in the said Schedule A, for the purposes and services expressed "in Schedule B annexed hereto."

Schedule B of the Appropriation Act is then the detailed expression of the will of the House of Commons as to how the expenditure for the financial year shall be made; and thus lies at the very basis of Public Accounts. Schedule B, in the Appropriation Act 1877–8, consists of eighteen pages, in which the expenditure authorised is shown in sixteen parts, and each part under the necessary general headings. These headings correspond with those adopted by the several departments in their "Estimates," or proposals to the Chancellor of the Exchequer for grants of money, and the figures shown against each head in the Act are the gross amounts with which the several spending departments, under Treasury sanction, are credited in their several accounts to meet disbursements. Parliament thus itself prescribes, and fixes to a pound sterling, the grand total entries on the credit side of the ledger accounts of the several spending offices.

The amount, for instance, to be spent upon the Navy for 1877-78 was specified by the Appropriation Act of 1877 after this manner :—

		£
No. 1.	For wages, &c., to 60,000 seamen and marines	2,684,048
„ 2.	For victuals and clothing for seamen and marines	1,178,610
„ 3.	For the expenses of the Admiralty Office	193,890
	* * * *	
„ 6.	For the dockyards and naval yards	1,341,680
	* * * *	

		£
No. 10.	For naval stores for building, repairing, and outfitting the Fleet and the Coast Guard....	1,207,300
	* * * *	
„ 12.	For medicines, medical stores, &c.	78,010
„ 13.	For martial law and law charges	8,147

And so further, under seventeen heads or "votes" in all, the figures being those arrived at, after discussions of the kind which the Parliamentary reports in the newspapers have rendered familiar, upon the estimates or proposals made by the Admiralty, and brought before the House of Commons by the First Lord. If the reader will turn back to the page in which was quoted a specimen of the Navy Estimates, he will see (at the foot of the second money column) that Vote 6, mentioned above, was granted to the exact amount asked for by the Executive: of course this is not necessarily the case; and, equally of course, it is the sum inserted in the Appropriation Act, not the sum proposed by the department in its Estimates, which has to be spent and accounted for, when there exists any difference. It is however but rarely—such is the excellent working of our Public Accounts machinery—that Parliament finds it necessary to alter or reject what is proposed to it by the Executive in Estimates.

The grants to the several other services are set forth in the schedule to the Appropriation Act in similar manner to that exemplified above in the case of the Navy; and the Treasury and Audit Office, in their respective jurisdictions over the issue and accounting for of Public Moneys, have to govern themselves accordingly.

It may, however, be easily imagined that, in the case of the army or navy, exigencies may arise in which more money may be wanted under one great head or "vote" than has been provided. To meet such a case, the Appropriation Act gives authority to the Treasury, upon application from the War Office or Admiralty—and in the cases of those two services alone—to spend a surplus under one vote for the purposes of another; but the Treasury has no power to authorize any expenditure which may cause an excess upon the aggregate sums appropriated for naval services or army services respectively; and in all instances in which the application of money granted under one vote to the purposes of another has been sanctioned, special account has to be rendered to Parliament, accompanied with copies of the cor-

respondence between the department concerned and the Treasury. The matter is then adjusted, and the principles of Public Account satisfied, by Parliament, if it approve the transaction, reciting the proceeding in the next Appropriation Act, and enacting that the "application of the said sums is hereby sanctioned." Occasionally, as may be imagined, there is an unavoidable excess of expenditure over the aggregate of votes; this, which happens chiefly in the case of the Army or Navy, has to be set right by a "deficiency vote" in the next session of Parliament.

We have now reviewed to some extent the preliminary definition, by the departments requiring supplies, of the purposes for which grants are required, and the legislative process by which the House of Commons authoritatively fixes the maximum of amounts to be spent; we have also stated briefly the process of issuing public money on account for public purposes: it follows to consider the means which Parliament takes to make sure that the declared and defined purposes of grants have been honestly and rigidly fulfilled, and all moneys spent as the nation by its representatives intended. Meanwhile, however, we must follow for a while the departmental dealing with money voted and issued on account.

All the great "spending departments," the Admiralty, the War Office, Post Office, &c., have agents of many denominations through which they make the payments necessary for the services administered. In the navy, for instance, every ship has a paymaster, every dockyard or victualling depôt its accountant or cashier: a similar staff for paying wages, purchasing stores, and dealing in the innumerable necessary ways with cash, exists in the army; and forms a part of the establishment of all the spending Government departments. These officers receive advances of money, in accordance with their probable requirements, from the "Treasury Chest" abroad; or they obtain funds by drawing bills upon their principals at home, who accept the bills, and refer them to the Paymaster-General for payment: the accountant officers are debited with sums thus received under the name of "imprests." This word is the official term for a charge to the accounting officer's debit, placed there to await clearance by production of subsequent accounts. Thus supplied with money, the several paymasters and others make the payments necessary and authorized in their several jurisdictions; and render periodical cash accounts to the financial section of that department in London which is charged, under the Treasury,

with their supervision. A large portion of the business of the financial sections of the clerical staff at the Admiralty, the War Office, and other spending departments consists in the examination of these periodical cash accounts rendered by paymasters and cashiers; the first function of the examiners being to verify the correctness of expenditure as between principal and agent, the office and the accounting officer. It is scarcely needful to do more than recite the existence of such a necessary but widely understood process, which consists mainly of seeing that every debit in the officer's account is authorized, and every credit entry sufficiently supported by vouchers, that the sums received are such as, under his instructions, the accounting officer is authorized to receive, and the sums expended such as, under his instructions, he is authorized to expend: it will however be readily conceived that, in such a service as the money transactions of a man-of-war for instance, the instructions are complex, the conditions of expenditure very various, and the liability to error of detail by no means inconsiderable: consequently that even this minor business of account may require skilled and judicious examination at the head-quarters of the several services. But besides this not inconsiderable work of examining accounts of its paying agents as between the department and its outlying accounting officers, the central staff of Government offices concerned with administering money has to "classify" or see that its sub-accountants have properly "classified" their cash transactions: in other words they determine (provisionally) the "vote" and "head of service" which is to be debited and credited in respect of the transaction, and, by posting the transactions under the several heads of grant voted by Parliament, make up the "Appropriation Accounts." It is the reviewing of this process of "classification" (equal to the process known in mercantile book-keeping as journalizing) and the resulting Appropriation Accounts, which is called Appropriation Audit; and this, as already indicated, is an audit as between the spending department and Parliament. Obviously, this review cannot be carried out by the department itself, without violation of the fundamental principle of accounts that audit must be independent. Appropriation Audit has therefore been intrusted by Parliament to the department known as the Exchequer and Audit Office, and this is the principal function of the "Comptroller and Auditor-General," whose central establishment is at Somerset House, and who has detached portions of his staff stationed as auditors at the Ad-

miralty, the War Office, and some of the other large departments. These gentlemen are amenable in no way to the authorities of the department over the accounts of which they exercise supervision; they are responsible only to the Comptroller and Auditor-General.

To form a due conception, however, of the position of the chief auditing officer in our system of Public Accounts it is desirable to trace, in brief, the development of the important and necessary functions which he fulfils.

The growth of *Public Audit* in England was, like most of our institutions, very gradual, and it began in a very incomplete form. Prior to Queen Elizabeth's reign the accounts of the Crown were examined by Auditors specially appointed for the purpose, or by the Auditors of the Land Revenue; or at times, as in the case of Sheriffs, the Keeper of the Wardrobe, &c., by Auditors of the Exchequer: the audit, in fact, was occasional, unsystematic, and but little, if at all, connected with Parliament. In the second year of the reign of Elizabeth were first appointed "Auditors of the Imprests," two in number; and these officers continued to exist down to 1785. These officials, as originally appointed, had no power to call upon parties to render accounts, but were dependent on the Treasury for obtaining them. This state of dependence on the Treasury continued till the year 1649, when the Auditors were empowered by the Committee of Public Revenue, sitting at Westminster, to call before them all such persons as had received any moneys upon Imprest or otherwise, to pass their accounts "according to the usual course of the Exchequer." Auditing fees were abolished by the same Committee. With the Restoration of Charles II the two Auditors returned to the former system of payment by fees and dependence on the Treasury; and this state of things remained till the abolition of their duties in 1785.

The first attempt by the House of Commons to establish a control over the grants of Parliament, and to check the appropriation of supplies, was made in 1667, when it was determined by the House that the money voted for the Dutch War should be applied only to the purposes of the war. Commissioners for this purpose were appointed, and the strictest scrutiny was made into the minutest particulars, as is observed by Pepys, who was examined before them on the expenditure of the Navy. "That "supplies granted by Parliament are only to be expended for par- "ticular objects specified by itself, became," says Hallam, "from "this time an undisputed principle recognized by frequent and, at

"length, constant practice." This may be considered the first establishment of a Parliamentary Audit, or, in other words, of an audit to a certain extent independent of the Executive. The Commissioners specially appointed in subsequent reigns, under various Acts, to "take" and "state" the Public Accounts of the Kingdom were independent of the Treasury; they also generally consisted of persons who were not members of Parliament. The duties of these Commissioners did not extend, however, to the accounts which were taken by the Auditors of the Imprests, which in 1785 included the accounts of the Customs, Post Office, the Paymaster of the Forces, Chief Cashier of the Bank of England, Master of the Mint, Treasurer of the Navy, Surveyor of the Works, Solicitor to the Treasury, Lord Chamberlain, Master of the Horse, Clerk of the Hanaper, and though last, not the least, Army Extraordinaries.

As yet, it will be observed, notwithstanding these temporary Commissions, there was no general scheme of control or superintendence over the whole of the Public Accounts; and the unsound system was in force of allowing the office which regulated and controlled the issue of public money the power also of auditing the expenditure. The Treasury issued money "without account," or "without account other than such account as may be required by them," without the knowledge of Parliament.

By degrees, however, attempts were made to obtain an independent audit: with this object Commissioners for auditing the Public Accounts were created by Act of Parliament in 1785, on the abolition of the two "Auditors of the Imprests," already referred to. The Board thus formed consisted of five Commissioners, paid at fixed salaries, fees for auditing accounts being abolished; but its appointment did not constitute a complete central or uniform audit, as there still survived a variety of auditing officials, each independent of the other, and responsible only to the Treasury. No general account was made up for audit until the year 1832-33 for the Navy, and 1846–47 for the Army and Ordnance.

Meanwhile, the disadvantage and expense of a sub-divided form of audit in many unconnected offices had led from time to time to absorptions by the Commissioners for Auditing the Public Accounts. The Auditor of the Land Revenue was abolished in 1799; the duties of the Commissioners for West India Accounts were transferred to the Commissioners of Audit in 1822. In 1832 the Commissioners for Auditing the Colonial Accounts were abo-

lished; the Comptrollers of Army Accounts, after many alterations as an independent body, were finally abolished in 1835.

Things were now moving in the right direction, and various other transfers and consolidations of duties and offices led to a gradual increase of the establishment under the Commissioners of Audit: in 1805 an additional Audit Office with three Commissioners was established by Act of Parliament; and in the following year the two Audit Offices were re-constituted, and made to consist of a Chairman and nine Commissioners. In the year 1850 the Treasury formally recorded their view that all accounts of the expenditure of public money should be audited by the Commissioners for Auditing the Public Accounts, and the exceptions to that rule had indeed by that time become rare.

After this came a long period of Parliamentary and official discussion upon Public Accounts, to trace which would go far beyond the limits, already great, to which these remarks have extended: it must suffice to say that the result was the passing, in 1866, of the Exchequer and Audit Act, upon which the existing method of dealing with the Public Accounts is based. Under this statute the Treasury has the duty of directing issues of money by the Bank of England to the "principal accountants," or departmental finance officers; but the Comptroller and Auditor-General must give his previous sanction, and must take care that the grants of Parliament for the several services are not exceeded. A daily account of all issues made by the Bank in pursuance of such orders is transmitted by the Bank to the Audit Office. Under the same statute accounts of the several supply grants comprised in the Appropriation Act of each year are prepared by the several departments and transmitted for examination to the Comptroller and Auditor-General, and to the Treasury. The Dr. or charge side of these appropriation accounts, it is prescribed, are to exhibit the sum or sums appropriated by Parliament (in a manner already described) for the service to which the account relates: on the Cr. or discharge side are to appear the sums which have actually been paid during the same period, exclusive of advances on account ("imprests") to paymasters and other disbursers of public money, which may not have been accounted for, or perhaps expended. Appropriation accounts must by law be accompanied by an explanation to the Audit Office of any excess of expenditure over grants, and showing how the balances on the preceding account have been adjusted. The Appropriation Accounts are examined at the office of the Comptroller and Auditor-General;

who is bound to ascertain, first, whether the payments which the accounting department has charged to the grant are supported by vouchers or proofs of payment, and, secondly, whether the money has been applied to the purpose for which such grant was intended to provide: if the Treasury direct, he is also to ascertain whether the expenditure has been properly authorized by that department. This done, the Comptroller and Auditor-General has to report on the Appropriation Accounts to Parliament. He is further empowered, if required to do so by the Treasury, to examine the accounts of receipts of revenue, and those of any receiver of money payable to the Exchequer, and report thereon to the Treasury. Accountants have an appeal to the Treasury against disallowances by the Audit Office; and it is enacted that the Comptroller and Auditor-General shall govern himself in accordance with the Treasury decision on such appeal.

The Parliamentary powers of the Audit Office have of late years been applied over a gradually increasing area, with an undoubtedly wholesome effect: a complete audit of stamps, for instance, has been introduced; and an extension of the examination of Navy expenditure is at this moment being arranged for with the Admiralty. Its officers examine in detail the whole of what is known as the Civil Service expenditure; and in regard to revenue it carries out an occasional "test audit," by selecting, at uncertain times, without previous warning, an item in the receipts, and tracing it through the departmental books of account.

In estimating the independence, in other words the reality, of the audit of Public Accounts, the question will here naturally arise, Whose servant is the Comptroller and Auditor-General? The answer is one which has not always been deemed entirely satisfactory: he is the servant chiefly of the Executive. He is appointed by the Queen; as is also his principal assistant: his staff are appointed by the Treasury. If, therefore, the Comptroller and Auditor-General audits the Public Accounts, is this an independent audit? The answer to this question can only be a qualified one. In so far as concerns the question whether the several Government departments—which are all under the Treasury for financial purposes—are spending their money as the Treasury, representing the Crown, desires, the audit of the Comptroller and Auditor-General is good and sound in principle: he acts in this matter as the agent and referee of the Treasury, and is independent of, and above, the officials whose accounts he supervises. But c the same officer properly audit appropriation accounts? The

reply to this question can scarcely be an unreserved affirmative. Such however is the present position of the matter: the officer charged with the audit of Public Accounts as between the Crown, which spends, and the Nation, which grants, is the appointee of the Crown.

Partly to neutralize this evident defect has been the aim of an arrangement now to be spoken of, but of no great completeness; the appointment, that is to say, by Parliament, session by session, of a Committee on Public Accounts. This committee is the only means at present provided for directly carrying out an independent Parliamentary control over the Treasury administration of public grants. As representing Parliament, it has, of course, paramount powers of examination, and thus may in some degree keep a wholesome check on the Executive in regard to the appropriation of public money: it can also examine the Comptroller and Auditor-General, who is the Treasury's principal servant in matters of Public Account. But the check which a Parliamentary committee can apply to such matters cannot be either close, or, as against wrongful intentions carefully disguised, uniformly effectual. Now it is not here insinuated or for a moment considered possible, that the Executive of the present day is or would be a party to the clandestine diversion of public money from the several appropriations prescribed by Parliament: we live in times when public morality is high, and political temptation small. It is conceivable, however, that as our history proceeds, times may again arise when political honesty may somewhat decay, and motives for playing false with public grants come into force more strongly; and independently of the question whether this may ever be the case, and a state of public tone arise in which the existing safeguards against tampering with the Public Accounts may prove insufficient, it can scarcely be denied that so long as the control and audit of public moneys rests with an officer of the Crown, and the constitutional control of Parliament is exercised chiefly by the necessary perfunctory agency of a Committee of Public Accounts, one fundamental principle of the constitution of these Kingdoms is but imperfectly carried out. Before a review of the Public Accounts system of England can conclude with a verdict that it is in all respects satisfactory, Appropriation Audit must be carried out by an officer who is in every respect the servant of the House of Commons, and in no degree the servant of the Crown.

JOHN CROWDY.

PART II.

ARCHITECTURE AND PUBLIC IMPROVEMENTS, SCIENCE, PAINTING, MUSIC, PHILANTHROPY, LEGISLATION, STATISTICS, AND CHRONICLE OF 1877-8.

ARCHITECTURE AND PUBLIC WORKS.

THE general course of architectural progress during the year 1878 has not been marked by any one achievement which can be singled out as the pre-eminent architectural fact of the year. There has been no lack of activity in the architectural world, in spite of the drawbacks arising from strikes in the building trades and the consequent delay or stoppage of work; but the work which has been carried out has mostly been of but average importance, so far as we include completed buildings; the few large works which stand out from the rest by their extent or importance are still in process of becoming, and the events which may be considered at all specially to characterise the year, must be looked for rather under the category of new schemes started and discussed (including some of paramount importance) than in that of completed works.

No suggestion of a new style, no systematic attempt at a new fashion in architectural design, has disturbed the equilibrium of architectural critics during the past twelve months; but it may be noted that the most important attempt at utilizing terra-cotta for high-class architectural design has, during the past year, been completed, so far as the main architectural features and character of the building are concerned, in the great structure at South Kensington, intended as the Natural History Museum of the nation, and planned and designed by Mr. Waterhouse. In our *résumé* of the architectural doings of 1877, reference was made to this building, and it was then prophesied—correctly, as the event has proved—that the promise of having the building in a state to be thrown open to the public during the year 1878 could not possibly be fulfilled. But nearly all the terra-cotta design is now *in situ*, and a visit paid to the building, under the guidance of its architect, by the members of the profession assembled at the Architectural Conference this year in London, formed a good opportunity for coming to a decisive conclusion in regard to the artistic and practical fitness of terra-cotta as a mate-

rial for modern architectural work on a large scale. The result of the survey was a judgment highly in favour of terra-cotta. Some practical difficulties in the manipulation of the material have been surmounted, and in regard both to lightness and security of construction (especially as against fire) and opportunity for the realization of a very refined style of artistic detail at a very moderate cost, the building must be pronounced a remarkable success from the purely architectural point of view; and the advance in the architectural treatment of terra-cotta in this building, as compared with its large neighbour the Albert Hall, is undeniable and very satisfactory.

The other great building which is in progress in London, the Law Courts, goes on slowly and steadily, but it cannot, unfortunately, be said that we see in this case any of that endeavour after excellence and success in a new direction which is so conspicuous in the Natural History Museum. It is to be feared that the Law Courts' building will remain as a remarkable monument of the fallacy of looking backward in architecture, and making architectural design a matter of sentiment merely. This huge pile of artificially contrived mediævalism is already in the rear of public taste, and the grim and barbaric-looking tower at the south-east angle has met with sharp but surely not undeserved criticism. The architect of the building has perhaps the most powerful and strongly-marked individuality among contemporary architects, but he has wilfully spurned the life and culture of the nineteenth century to take up with that of the thirteenth; and the nineteenth century will have its revenge upon him accordingly.

Another worker in the field of modern mediæval architecture, the most prominent and successful of all, has departed during the year, and perhaps the death of Sir Gilbert Scott may be called the most noteworthy event in the architectural annals of 1878. An enthusiast, a hard worker, a brilliant and gifted draughtsman, and an orderly and business-like man with a keen eye to the main chance, he had the good fortune to find himself, with this useful combination of qualities, entering on his professional life just as the tide of the mediæval revival was coming towards its height, and upon its current he rapidly sailed into a professional success almost unexampled. Though an enthusiastic believer in mediæval architecture, he, however, regarded it in a more practical and modern spirit than did most others of the eminent Gothic architects of the day, and was, during the later

part of his career especially, fully alive to the necessity of considering the demands and habits of modern life and adapting the revived style to them. As is well known, he did an immense amount of work of the kind called "restoration," most of the principal cathedrals of the country having been through his hands; and though it may be said that his zeal for extracting the history of old structures, and endeavouring to bring them back to their pristine beauty, carried him too far sometimes, he really did a great deal towards elucidating their history and architectural design; and his enthusiasm in the matter was perfectly genuine, and by no means deserved the harsh and almost libellous charges brought against him of late years, by those who had set up a counter-cry against all restoration whatever, good or bad.

From speaking of the subject of restoration, it is an easy transition to refer to one or two matters of interest connected with old buildings which have taken place during the year. The removal of Temple Bar is, of course, the incident which has most interested the general public. Many may have regretted the necessity for the removal of so interesting a monument, but few can have questioned that it was a necessity. The restoration of St. Margaret's, Westminster, one of the most historically noteworthy of London churches, has excited some interest, and little difference of opinion, for the restoration has essentially consisted merely in removing from the interior the excrescences and lumber with which it was disfigured, and renewing and repairing the old work where necessary. A good deal of talk has been made about another very valuable monument of Old London, the Buckingham Water-Gate, and the propriety of doing something to rescue it from its present degraded and half-buried state, and it is to be hoped this will ere long be attended to. The discovery, in the course of some repairs at St. Paul's Cathedral, of the basement walls of the chapter house of the former cathedral, has been an interesting event, as bringing suddenly to light a relic of a building, every trace of which was supposed to have disappeared. But the most remarkable event in regard to old buildings has been the forcible putting straight of the south wall of St. Alban's Abbey, which had diverged nearly three feet from the perpendicular, and, after careful preparations, was one morning quietly pushed back to its position by hydraulic power with entire success; an operation which has never previously been carried out on so large a scale and with such a heavy mass of material. The question of the further treatment of the building

has excited some acrimonious paper warfare, and it is to be feared there is too strong a tendency, on the part of those chiefly concerned, to over-restore the building and impair its historic value and associations. A different spirit seems to have animated those who have been occupied in what may be called the restoration of Jedburgh Abbey, a restoration which appears to have been entirely conservative, and more correctly described as repairs and the removal of obstructions and excrescences of modern date from the venerable structure.

The Wellington Monument has at last been announced as complete and thrown open to the public. To those interested in art, the general design of the monument and its remarkable power have been long known, and the appearance of one of the principal groups of sculpture ("Valour and Cowardice") in the Sculpture Gallery of the Royal Academy, two or three years ago, was the artistic event of the season, and impressed every one with great expectations from the whole monument when complete. But the grandeur of Stevens's design is all but lost and wasted from the miserable manner in which the monument is placed, so that the principal sculptured groups can only be seen as a dark mass against a window, which, instead of lighting, serves only to obscure them. That twenty years of the work of a man of genius should thus be ruined through want of consideration as to the most ordinary questions of lighting and point of view, is an absurdity only too lamentably characteristic of this country. The subject of the decoration of St. Paul's has entered on a new stage, owing to the discovery of a powerful sketch left by Stevens for the decoration of the dome, of which the Committee have become the owners, and which they profess their intention to use as the basis of the decorative design, an intention in which they have found two very eminent artists, Mr. Leighton and Mr. Poynter, willing to assist them. Cartoons by these artists, representing as nearly as possible the appearance of mosaic, are to be made and placed in position so as to allow of a judgment being formed of the result before the execution of the design in a more permanent material. This is so far well, but it is to be feared that much money will be thrown away before anything satisfactory is evolved, and that the ideas of the Committee, if fully carried out, would end in destroying all the repose of the interior and rendering it a kind of raree-show of decorative fancies.

A monumental statue of a great man has been added to our

list during the year, that of Mill, by Woolner, appropriately placed in the vicinity of the School Board and facing towards Westminster. The statue, which is in a sitting position, is successful, both as a characteristic portrait and in sculpturesque effect, to a greater degree than with many of our statues of the kind. The figure of Captain Cook, by the same artist, attracted considerable attention when exhibited in Waterloo Place previous to its departure from this country; and the erection of a monument to Lord Falkland, at Newbury, during the year, is an event of some national interest in the not very satisfactory annals of monument-making.

In church-building there has been about the usual amount of work, perhaps on the whole rather less than more; no new churches or ecclesiastical buildings of great importance are to be cited. There seems to have been rather more movement than usual in the ranks of Roman Catholic church-building; we may cite a Dominican church at Cork, a building of the orthodox basilica type, by Messrs. Goldie and Child; and a monastic church at Manchester, by Messrs. Pugin, Ashlin, and Pugin; and an important architectural competition has taken place for the honour of building a new chapel in the grounds of the well-known Brompton Oratory. A large and architecturally important new synagogue, nearly completed, in the Bayswater district, is also an event to be noted in connection with buildings for purposes of worship.

Among public buildings it may be recorded that the new Metropolitan Poultry Market, a companion to the Meat Market, has been finished and opened during the past year; and there has been considerable activity in the building of city halls; the Carpenters' Hall and the Leathersellers' Hall have been rebuilt, the former in a very stately and rather pretentious classic style, "handsome" rather than picturesque. It seems a pity that in rebuilding halls which have so respectable a historical prestige as those of the city companies, there should not be more attempt made to give individuality of character and to connect the building, in its design or its decoration, with the special objects of the guild for which it is erected. In the way of public buildings, although the great run upon new town halls has somewhat abated, there have been some important works completed and projected. Birmingham has completed her new municipal buildings, the rather unsatisfactory result of a large competition in which it can hardly be said that the best man won, or the

best building; and Liverpool has started the erection of new law courts in contiguity with her fine block of municipal offices completed not many years ago. Vestry halls have of late become prominent features in architectural improvement; and the proposal for rebuilding the Kensington Vestry Hall was the occasion of an architectural competition early in the year on which an unusual aggregate of talent was concentrated. The existing vestry hall at Kensington was built only twenty years since, to supersede an old and decayed building, and was then thought an ambitious and important work, yet its duties have already outgrown it, an instance of the rapid progress of late years in the wealth and influence of the vestry bodies of London. At Liverpool, the London and North-Western Railway station is being doubled in size by the addition of a second station, with a new iron roof of great span alongside of the existing one; and the same town has in various stages of progress a new stock exchange, a new corn exchange, and a new liberal club, and has selected the plans for a new infirmary; while on the other side of the Mersey, Birkenhead has just opened a new railway terminal station of considerable size and importance. Among public buildings and institutions for recreation Southport (a place which has advanced at an almost incredible rate in size and importance) has its project for a new art gallery and library; Burslem has its new market; Tynemouth its new aquarium; Hastings its new swimming baths, of very ornate and costly design; Blackpool has its new winter gardens, Morecambe its gardens and aquarium. The aquarium movement, it is almost needless to say, has become a distinct feature in recent architectural work, but unfortunately not with very happy results architecturally, for though there is no doubt that an aquarium might be made both internally and externally a very interesting and beautiful class of building, as a matter of fact aquarium architecture has usually fallen into the hands of persons of somewhat vulgar and tawdry tastes, if we are to judge by results. Among improvements begun or put in train in London may be mentioned the rebuilding of Knightsbridge Barracks, concerning which there has been much difference of opinion as to whether it should be looked on as an improvement or otherwise, the balance of intelligent public opinion having decidedly inclined towards the entire removal of the barracks from a site where dwelling-houses of the best class are rapidly increasing in number, and to the development of which as a first-class residential neighbour-

hood the near vicinity of large barracks is unquestionably a drawback. Governmental authority, however, has been obstinate, and the barracks are being rebuilt on the site where they have so long been objected to; of course, with a more presentable (though still sufficiently ugly) building, and a few more feet given to the roadway, which the old barracks compressed very inconveniently; still, here is an opportunity for improving a minor thoroughfare of West London thrown away. The Metropolitan Board of Works have at last turned their attention to the advisability (we might say the necessity) of applying the powers given by the Artisans' Dwellings Act to the forcible amelioration of some of the worst and most unhealthy districts in London, and schemes have been made out for two improvements, in Westminster and St. Giles, which, however, have not yet got past the stage of lying open for inspection at the offices of the Board. In relation to the subject of possible improvements it may be mentioned that the *Builder* promulgated in September a plan for a very large and extended improvement in the Westminster district, having for its object to raise Westminster, or the portion of the neighbourhood of the Houses of Parliament and the Abbey, to the level of a first-class residential neighbourhood, more in accordance with the architectural and historic dignity of the great buildings which form its centre. Among other changes imminent in London architecture may be counted the addition of a new wing to University College, and the fact that the space where Drummond's bank stood, and which has been long occupied by the overhanging scaffold used in taking down the old building, is at length in process of being filled up by the new buildings for the bank, in which we hope to find a desirable addition to the architectural effect of Charing Cross.

Street architecture has progressed much as usual in regard to quantity, but nothing new in the way of the treatment of ordinary street houses seems to have been evolved. The better class of detached houses in the new West End neighbourhood of London consists mostly of the very red brick "notions" in the "Queen Anne" manner which have become a fashion, and will have their day like every other fashion in modern building. The new buildings which are to adorn the sides and end of Northumberland Avenue appear to be so far of the most commonplace description, and make us regret another opportunity lost of introducing something more interesting and artistic into London street architec-

ture. But we may notice, while on the subject, that a great deal of attention has been paid by architects, contractors, and others during the past year to the various means of building with concrete, and one or two new steps have been made in the invention of methods of treating and manufacturing the material architectually. There are now several methods before the public for use, each possessed of its own advantages, and among which it seems possible to attain a considerable variety in concrete building while still realising the economy in material and construction which is the chief recommendation of concrete, and seems to point it out as the best source of the combination of economy and picturesque effect for the street architecture of the future.

The opening of the new Dining Hall and Library of Keble College, built from the designs of Mr. Butterfield, has been an event in the architectural development of Oxford, which has also witnessed the opening of another important building, the new Observatory, designed by Mr. C. E. Barry, a symmetrical building the function of which is pretty well marked out by its development of domical coverings. With these two buildings, both connected with the higher aims of life, may be contrasted two of purely utilitarian purpose which have been completed in London this year; the great "cold storage" wharf and vaults under the Cannon Street Station, and the landing pier and warehouses at Thames Haven for the Petroleum Storage Company. Uninteresting as these works may seem architectually, a great amount of skill and science was brought to bear upon their construction, and on their successful results depends a great deal in regard to our cheap food supply and our immunity from some of the most dangerous forms of explosive accidents. Among other erections which are useful, though not beautiful, it may be mentioned that the past year has witnessed the completion of the largest gasometer in the world, near Kennington Oval; which was completed, however, not without protest from the neighbourhood, through the official mouthpiece of the Lambeth Vestry.

Practical schemes of public improvement on a very large scale and involving most important interests, have been under discussion during the year. Pre-eminent among these in importance is, perhaps, that of water supply to London; in regard to which it is matter for congratulation that the scheme proposed by two engineers, and favoured by the Metropolitan Board of Works, for further complicating the water service of London by intro-

ducting a double supply to every house, has been to all appearances definitely shelved under the pressure of public and scientific opinion. The project for drawing water from Thirlmere Lake for Manchester, in spite of the violent opposition it met with from persons whose sentiment was supposed to be outraged, will no doubt be carried out, and will be in the end accepted as a satisfactory solution of a very great practical difficulty. Liverpool is laying down the lines of an equally large water supply scheme, of which more will doubtless be heard soon, for forming an artificial lake for intercepting part of the waters of the Verniew, in Wales. London is still looking for water and finding none; and it seems probable that ultimately her resource will be to tap some natural reservoir in the same way that Manchester proposes to tap Thirlmere.

The proposition for a new bridge over the Thames below London Bridge has been much "ventilated" both in public journals and among scientific men, and a formal report, presented by Mr. Bazalgette to the Metropolitan Board of Works, showed the feasibility of a bridge which would answer all demands both of road traffic and shipping. That such a bridge will at no distant date be constructed there seems no doubt, and it is to be hoped that in view of this the various, and in some cases decidedly dangerous, projects which have been suggested for increasing the traffic capacity of London Bridge, will be abandoned. In the meantime we have been told that one of our finest bridges, Waterloo, is not in such good condition as it might be, and has shown a tendency to settle so far as to threaten the equilibrium of the arches, the peculiar shape of which, while admirably adapted to give the maximum of room and headway for passing craft, renders the masonry very apt to feel the slightest movement of the piers. We are assured, however, on very high engineering authority, that the structure will give further warning before it approaches a state that can be called dangerous. Important improvements are being carried out in Waterloo Station—certainly not before they were wanted—and the capacity of the station will ultimately be considerably increased. A great deal of important practical work on a large scale is, in fact, waiting to be done, and as a legacy of the past year to its successor is, perhaps, the best that could be; for it is in solving really tough practical problems that the best corrective is found to that merely sentimental taste in architecture which aims at nothing but reproducing the styles or fashions of the past.

THE EXHIBITIONS OF PICTURES IN 1878.

THE picture season suffers more and more from a plethora of exhibitions. Prudent sightseers make a wary selection, or keep to the few which they know to be representative. But the many are tempted by attractive advertisements or glowing criticisms, or by the wish to keep on a level with the talk of the day; and as a consequence become early satiated, and long before the season wanes exhibitions and pictures are alike voted a bore. Much really good work thus escapes recognition, and scarcely any receives the thoughtful consideration required to understand work of a high order. Half the exhibitions are mere trading speculations, got up by picture dealers or publishers of engravings. They serve their purpose we may suppose from the persistence with which they are continued, and the zeal with which they are puffed. They serve also to mark the current of fashion in art production, but they give no indication of the progress or actual position of contemporary art, and certainly none of its future promise.

Probably the great French Exhibition had an adverse influence on the London Exhibitions. The leading painters naturally wished to appear at their best in the international competition, and their thoughts and works were diverted from the collections at home. The English pictures attracted their due share of attention on the banks of the Seine; but they scarcely seem to have been fairly appreciated. We all know what is said of the advantage of seeing ourselves as others see us, and our painters if they had listened might this year have had the full benefit of such knowledge. The French critics appear to have been rather puzzled than enlightened by the English pictures. They questioned whether English painters had advanced since the former great gathering of their works in Paris, more than twenty years ago. Of one thing, however, they had no doubt—that the English painters are a long way behind the French, especially in style, composition, and power of expression; also they venture to say in colour, and notably in technical skill and knowledge. But the judicial expression of opinion was even more remarkable than the critical. To only two painters of the English school were grand medals (*médailles d'honneur*) awarded, and of the two recipients, one, curiously enough, was a German, Mr. Herkomer, the one English-

man so honoured being Mr. Millais. Two medals in the next class were also given, one to Alma-Tadema, the other to Mr. Watts; here again one of the two so honoured was a foreigner. We say nothing of the selection; but it is noteworthy as indicating the view taken of English painting in 1878 by a jury of Continental experts.

Leaving, however, the French Exhibition and French opinion, we will come at once to our principal home display. There can be no doubt that the Royal Academy Exhibition was generally regarded as below the average. It contained no works, it was said, that seized and retained the popular eye, few that satisfied the cultivated mind. Works of great daring, nobleness or dignity of purpose, lofty imagination, striking originality, or even decided novelty were wanting. The leading painters were absent or represented by works of a secondary order. All this may be in a measure true, though we hardly accept it as a fair representation, and yet we think the exhibition was, if not a great, a fairly good one, better in fact than several we have had of late years. We must not place our standard too high. Painters, like other men, must be ruled by their conditions. We are a commercial people, and estimate pictures by their marketable value and painters by the prices they can command. The picture dealer is the true art patron now. He dominates the market, and his fiat is decisive. What he wills must be done. On the bulk of the work therefore we must look for the trade-mark. Putting out of account then for the moment painting of the highest order, we may very safely say that the exhibition showed better work in the main than its predecessors, and this, which is very important, chiefly in the productions of the younger men—more of serious purpose, often a better choice of subject, better drawing and despite some affectations, better colour; altogether, in short, evidence of a higher technical training and of conscientious application.

Scriptural subjects were comparatively few, and those were rather dramatic than religious in purpose and treatment. Purely historical works were also uncommon. Here as at the French Exposition Millais would probably have been assigned the laurel. His "Princes in the Tower" (21), though little more than the portrait of two boys, is the best subject picture—it can hardly be called historical—Mr. Millais has painted for many a day. For once he seems to have been possessed by his theme, and not to have concentrated his thought and skill on dress and acces-

sories. The conception is very simple, but full of feeling and poetry, and the treatment comes home to everyone's sympathies. The two princes, dressed plainly in black velvet, the elder distinguished by the Garter and a golden neck-chain, are alone in the murky vault, listening at the stair-foot in vague terror to the descending steps of the assassin, it may be, whose shadow we see thrown forward, but which is unseen by the brothers who, hand clasped in hand, turn instinctively away from the dread approach. The expression on the boys' faces is painfully true and touching and the feeling of utter isolation and helplessness is powerfully suggested. Something is wanting, however, to make it perfect as a work of art. The manner of the time has scarcely been caught; the features are of the nineteenth rather than of the fifteenth century type, and the costume has the air of a modern imitation; but the picture is, as a whole, a really good one, and its success should stimulate the painter to further and more earnest effort in the same direction.

From Millais we may turn to the other chief prize-taker at the French Exposition, Mr. Herkomer. Not that his work is historical however. On a canvas of large size he represents "Eventide: a scene in the Westminster Union" (1,002); not a very promising subject, as would seem, to fill so large a canvas, but one which has been worked out with great power. The scene is the long room of the female side of the Westminster Union, and looks even more dreary than such places usually look; but room and inmates have alike been painted from the reality. Hence, no doubt, its vigorous truthfulness. The interest lies in the foreground group, the rest of the canvas, with powerful effects of light and shadow, is much of it space to let. But the foreground group is admirable for its distinctive characterization. Nothing can be truer to life than the poor old women in the last stage of feeble senility; and they are arranged and contrasted with surprising skill, seeing that all, except the nurse are of extreme old age. The thoroughly English character of the faces is remarkable as the work of a foreigner; but Mr. Herkomer has been for some years domiciled among us, and has not only carefully studied, but evidently mastered the national character. The picture is cleverly painted; but with what intent has it been painted? The subject is hardly an agreeable one for a drawing-room, and we have no gallery in which it is likely to find a permanent home. It would make an appropriate decoration for the board-room of the Union; but

if the guardians had sufficient taste and liberality to purchase it, the auditor or the Local Government Board would come down upon them with a surcharge.

"Our Lord after His Resurrection, with the two Disciples on the road to Emmaus" (58), J. R. Herbert, R.A., is a serious attempt to deal with a difficult Scriptural event. Mr. Herbert, as might be expected from all his recent religious pictures, makes full use of his Eastern studies, and delineates the scene in a thoroughly realistic way. The disciples wear the garb of Eastern peasants, and the Master is similarly, though, perhaps, somewhat better, clad. The spacious landscape is no doubt true to the locality alike in rocks and herbage, and absence of atmosphere. There are some touches of symbolism, but the uninitiated spectator would hardly suppose he was gazing on anything other than a modern Eastern landscape. The disciples are stolid peasants, and yet if the painter had carried his eye a few lines onward in the narrative from the verse he quotes, he would have read how their hearts burned within them as He talked with them by the way. No corresponding feeling will be evoked by the picture whatever be thought of its technical qualities. Mr. Herbert's smaller picture, "David, the future King of Israel, while a Shepherd at Bethlehem" (231) watching his sheep by moonlight, displays more feeling, if not a higher inspiration.

Mr. Armitage was not fortunate in his Scriptural pieces. His "Cities of the Plain" (210), Abraham, in the early morning, looking towards the burning cities, must be regarded as a failure. The cities are dwarfed into insignificance by distance and the disproportionate size of the patriarch; the glare is untrue, and the whole quite unimpressive. Nor is "The Mother of Moses" (356) a much happier effort. His most successful work is that in which he is least ambitious, (111) "After an Entomological Sale," himself, the happy purchaser at Stevens's of a most rare beetle, the centre of a group of fellow painters and grub-hunters—capital portraits all and painted with genuine gusto. But if Mr. Armitage failed for once in his Scriptural themes, what shall we say of another Academician's enormity—"The Dedication of the Infant Samuel?" Here surely silence is best; but there ought to be some authority to veto the hanging of such pictures on mid-line.

Of the Scriptural pieces by non-Academicians we only remember one that calls for notice, "The Death of Ahab" (533), by Mr. T. M. Rooke, too ill-placed to be fairly estimated, but,

as it seemed to us, a work of considerable power and some originality of treatment. Outsiders are evidently afraid of undertaking works of this order for the Academy Exhibition. It is a pity, for elevation of purpose among our younger painters needs all possible encouragement just now.

In classical and poetic art we have little this year to boast of, the contributions being few in number and with rare exceptions of little importance. The most carefully considered work was No. 379, "Britomart and her Nurse," by G. F. Watts, R.A., a painting which, after being some years on the easel, was at length offered to the public verdict. It proved, we fear, caviare to the general; but it was a work full of subtle thought and poetry. If Spenser were more read the purpose of the picture might have been better understood. As it was, without a word of explanation in the catalogue, it passed, we fear, very generally for what a brisk young lady described it,—"a fright of a girl sitting with her back to a queer round picture, in a terrible scare, but whether at something she has been reading in the big book on her lap, or at what the old gipsy is whispering into her ear, is more than anybody can make out: very fine I dare say, but very very brown." But familiarity with the Faerie Queene would hardly have enabled the flippant damsel to read the riddle without something of the poet's perception; for Mr. Watts has used freely the painter's licence. He has filled the back ground of his picture with a vast mirror enclosed within a circular frame, but "The mirror which the great magician Merlin devised," and into which Britomart gazed, "round and hollow-shaped, was, like to the world itself," a "glassy globe," not a flat mirror. Probably what Spenser had in his mind was the sphere used by Dr. Dee in his divinations and showed at her desire to Spenser's Queen, and which may have been seen by the poet himself. Again, there is no hint in Spenser of Glaucé looking into the mirror as she is here represented; but we are expressly told that Britomart herself interrogated it in her father's closet, her father only being there, when

> "Eftsoons there was presented to her eye
> A comely knight, all arm'd in complete wise,"

while Mr. Watts shows three other knights besides Sir Arthegal. The conversation between Britomart and her nurse consequent on the vision in the mirror, is described by Spenser as taking place one night when the maiden was in her bed "tost with

unrest;" but here she is in broad daylight fully dressed with an open book, possibly of Destiny, on her knees, to which there is no reference whatever in Spenser. However, we have no objection to these departures from the text if thereby the painter's idea is the better evolved. We only wish he would tell us exactly what that idea is.

Mr. Poole's "Solitude" (146) is another poetical picture, inspired by Shelley's "Alastor," of which the meaning is somewhat obscure; but which, apart from its purpose, would be memorable for the exquisite glimpse of moonlight on the left of "the mighty shadow" of the rock. His other picture, "Smithfield: the morning after the burning of Anne Ascue for heresy—looking for Relics" (487), belonged to the soberer domains of history, and whilst retaining, and in some measure emphasising his old peculiarities of manner, displayed much dramatic power.

Mr. Poynter, too much occupied with his duties at South Kensington and the French Exhibition, and possibly with portrait painting, to complete any of the great works we are accustomed to look for from his pencil, exhibited only "Zenobia Captive" (43), a noble study of the captive Queen of the East, in all the affluence of Oriental splendour, but only a study, though indicating as we would fain believe that the painter is directing his thoughts in earnest on a subject that in his hands would be of splendid promise. Mr. Leighton's classic contributions were a "Nausicaa" (145) and "Winding the Skein" (205), both beautiful, but the latter perfect in its sober, antique Greek feeling. The execution is equally refined, but carried to an almost wax-like smoothness.

Mr. Long fully maintained his reputation by "The Gods and their Makers" (129), a group of light-hearted Egyptian girls busy modelling and painting the grotesque idols of the Nile. A bright and amusing scene, it seems to bring a glimpse of the inner life of ancient Egypt vividly before us. There is learned but unobtrusive study in it; excellent drawing and modelling—note especially the back of the girl on the left—well-balanced composition, and a skilfully managed harmony of subdued colour. Mr. Alma-Tadema was hardly equal to himself in his "Sculptor's Model" (255) or "A Love Missile" (256). The representation of surface was indeed in the latter simply matchless, but beyond the surface both were *nil*.

What Mr. Long has done for ancient Eastern domestic life Mr. Barclay has done for modern, in his "Women Moulding

Water Jars, Algeria" (53), and done it in a way that throws some light on ancient domestic art. The women are moulding by hand, without the wheel, those large earthen jars travellers are so familiar with; and the process is so clearly shown that there is no difficulty in understanding how the ruder ancient amphoræ were wrought. In "Women Filling Water Jars at a Spring" (183) Mr. Barclay has given another, though less interesting, proof of his close observation of Algerian life and capability of representing it. Mr. Hodgson's "Eastern Question" (97) is an amusing and cleverly painted colloquy between a couple of men-of-war's men and a trio of rascally-looking Turks. "Loot" (635) is less agreeable.

A pleasant contrast to these foreign themes was afforded by Mr. J. R. Reid's "Sussex Cricket Match" (77), the freshest and brighest picture of country life in the exhibition. Every bit of it is as true as the scene, and it is put together with thorough artistic tact and feeling. The figures in the principal group are unmistakably Sussex, and show nice discrimination of character, and the positions and placing of the players prove Mr. Reid to be both a cricketer and a keen observer of cricketing. The picture is, moreover, exceedingly well painted. With it may be placed Mr. Eyre Crowe's carefully studied "School Treat" (567), a scene of the marshalling of the pleasure vans at Burnham Beeches, very nicely painted, and very true—correct as a photograph and as cold.

Another class of figure subjects, that in which sentiment, conveyed by means of some domestic incident, is predominant, was largely represented, but must be passed over here very lightly. Leslie's "Home, Sweet Home" (64), is a graceful little idyll, with a pleasant old-fashioned savour; and with it Marcus Stone's "Post Bag" (71) might well pair off: both, as befits the themes, are very daintily painted. Mr. Orchardson's "Social Eddy" (308), and Mr. Boughton's "Waning of the Honeymoon" (172), tell with equal delicacy and with just a touch of sarcasm the old story of feminine hopes and disappointments.

Among the works which seek to point a moral, Mr. Frith's series of "The Road to Ruin" (291–5), was the most conspicuous. It is a daring thing for any man to measure his strength against Hogarth. But Frith has directly challenged the comparison by choice of subject and by making his pictures of the same size as Hogarth's famous series. It is no discredit to fail in such a competition, and Mr. Frith has failed, and failed at every point.

The cleverness of the pictures is undeniable, but it is the cleverness of the stage, not the terrible reality of social life. Mr. Pott's gambling scene, "Fallen among Thieves" (435), had more of the truth of actual life. The most powerful and the most painful work in this class was Mr. Holl's Newgate scene, "Committed for Trial" (423). Perhaps with these should be placed another very able picture, though too crowded to be fairly appreciated in an exhibition room, Mr. Staniland's "Good-bye" (594)—the departure of an emigrant ship.

Mr. Marks had no "Jolly Post Boys" to enliven this year's exhibition, but he had a group of sage and solemn birds, "In Convocation" (216), that was almost as comical. The cranes, laying down the law with solemn pomp, or turning aside with arrogant strut or ostentatious sneer, or listening with complacent indifference, whilst secretaries bow their heads submissively reverent, would doubtless be as true in Berlin or Lambeth as in this unnamed region; and the keen or unmeaning eyes, with the innumerable wrinkles gathering about them, might as well have engaged the pencil on statesmen and prelates as on these sage and serious cranes. Every one who has seen has heartily enjoyed the picture, but we hope that now he has shown his mastery in both lines, Mr. Marks will come back to real humanity and leave to feebler hands the burlesque of it.

In this line Mr. Rivière's "Anxious Moment" (392), a flock of geese waddling forth to their common arrested by a battered hat which lies full in their way, about which they gather in open-mouthed amazement and indignation, the valiant gander striding to the front and hissing defiance with swollen chest and uplifted head to the mysterious foe, is equally admirable. The variety in the heads and in the expression of eye and bill could only have been the result of close study. Not less humorous is the same artist's "Sympathy" (496). A little girl in trouble or disgrace, or in a passing fit of the sulks, has seated herself on the topmost stair, whither her "faithful friend and partner of her woe," a big bull terrier, has followed her and placed his head on her shoulder with the most seriously comical expression of sympathy possible. The painting of the dog is perfect: Landseer when at his best never threw more genuine human expression into the canine countenance. Mr. Rivière had a more poetic and more ambitious painting (No. 201) of lions prowling by moonlight about the ruins of Persopolis, a work of much beauty.

We can but glance at the portraits. Precedence must, of

course, be accorded to Mrs. Langtry, of whom there were no fewer than three representations, by Millais, Poynter, and Weigall, neither, perhaps sustaining the society superlatives respecting the lady's beauty, though it may be that the painters, old hands as they are in that line, were dazzled by it and showed less than their accustomed skill. Such as they are we prefer Mr. Poynter's, though Millais's is the more striking figure; but taking them both, and considering the model they had to work from, we think it clear that our painters of female portraits have fallen far from the standard of Gainsborough and Reynolds, or—what is far more difficult to believe—the ladies of our days have lost much of the sweetness, grace, and charm of their great-grandmothers. The portraits of men were on the whole better, and two or three were fairly satisfactory; though the men approach even less near than the women to the Reynolds' standard. No one could for a moment conceive Reynolds putting on canvas so lugubrious a visage as that of "The Earl of Shaftesbury" (242). If he had seen worn in it the lines of care, anxiety, habitual pensiveness, he would have seen and shown also resolute purpose, manly persistence, and something of that earnest philanthropy, to which all pay honour. On the whole, Mr. Ouless's portraits were the most satisfactory this year, though several of them were of uninteresting people. Mr. Richmond's, as usual, were capital specimens of the polished-up style. Allowing for a little of Mr. Richmond's invariable process of beautifying, nothing could possibly better represent the self-possessed and fairly self-satisfied "First Lord of the Admiralty" (287), or the placid, suasive phase of the late Sir Gilbert Scott's countenance (460). Among the portraits noteworthy on account of the persons represented were those of Robert Lowe; Joachim; Armstead the sculptor, by Wells; Irving as Richard III, by Long; and last, but not least, Thomas Webster in his donkey carriage, painted by the veteran's own hand.

The landscapes which attracted most attention, were Millais's "St. Martin's Summer" (465), and Brett's "Cornish Lions" (105). "St. Martin's Summer" is a merry little Highland burn making its way by leaps and falls down a narrow rocky glen; and it is handled with more warmth, feeling, and power than the painter has accustomed us to of late. Mr. Brett's view on the Cornish coast, with huge, massive, isolated, broken, and storm-beaten rocks is very striking. Though broader in style than his early landscapes, it is laboured with scrupulous exacti-

tude; the drawing of the wave-curves and foam-crested incoming rollers is of the nicest subtlety, and the discrimination of surface in rock, lichens, sand, and sea is perfect. Only to our eye the colour still seems too garish, the near sea too green, the purples too strong. Under peculiar atmospheric conditions such colour might be seen, but then those distant rocks would have been, rock and herbage alike, less particularized, less definite, showing mystery instead of detail, whilst here the distance is as minutely defined as though made out with the aid of a field-glass.

Our old friend Linnell was there bright and glowing as ever, determined, as would seem, to go on, pencil in hand, like Titian, till he has numbered his ninety years and nine. Mr. Hook's "Coral Fisher: Amalfie" (351), was fresh and pleasant, as his land and sea scenes always are; but it only makes us long to welcome him to his old English shores again. In "The Alps at Rosenlaui" (268), we have another thoroughly English landscape painter seeking to renew his strength by change of scene and country. It is an able and conscientious work, but as yet Mr. Vicat Cole seems most at ease in a native "Showery Day" (20). Mr. E. W. Cooke is quite at home, it is almost needless to say, with "A Dutch Galliot aground on a Sandbank" (182); but a bolder achievement is the "Cleopatra in the Bay of Biscay" (330), at the moment when the hardy crew of the strange craft, struggling vainly with the huge waves which are beating over her, signal to the *Olga* to cast off the tow-rope. In strong contrast with this wild scene are Mr. Davis's summer pastorals—"Mid-day Shelter" (134), "Evening Light" (175), "Afternoon on the Cliffs" (147), and "The lowing Herd winds slowly o'er the Lea" (615); in all of which the landscape and animals are painted with great truth and feeling, and the dappled sunlight is effectively imitated. Only in looking at them together is there felt a slight sense of sameness of character and handling, and we come to desiderate somewhat more crispness of touch.

The younger men had several good landscapes, which were not however always well or fairly hung; indeed, there is in this matter much room for amendment at the Royal Academy. Among the pictures which call for recognition were Mr. C. E. Johnson's "Timber Waggon" (3), Bright Morris's "Evening by the Old Mill" (72), Val Davis's "Evening Glow of a Winter's Sun" (87), Frank Walton's capital Surrey heath, "Four miles from any Town" (436), P. Graham's somewhat too conventional "Wandering Shadows" (267), MacWhirter's "Three Graces"

(430), and especially Mr. E. H. Fahey's "All among the Barley" (613), the daintiest, freshest, most genuine spring idyll of the season, as delicately and sweetly painted as it is refined in feeling and pure in taste.

The Grosvenor Gallery forms an interesting supplement to the Royal Academy, and a curious artistic and psychological study. You see what is the latest phase of fashionable high art, the art as you are told which, though caviare to the Philistine mind, is sweetness and light to men, and still more to women, of culture. You will see miracles of "pathetic" form and feature, and "symphonies," "harmonies," "nocturnes," "schemes," "arrangements," and what not of colour. Happily the number of pictures is small, and satiety does not come in before the feeling of wonderment is exhausted. The general sameness of the exhibition is explained by the fact that only the works of artists invited by the founder of the gallery are admitted. As in the previous year, Mr. Burne-Jones was the leader of the host. In all, eleven of his pictures were exhibited, among them being the "Laus Veneris," "Le Chant d'Amour," "Pan and Psyche," "Day," "Night," "Luna," and four most melancholy "Seasons." Mr. Burne-Jones is a painter of great power and evident earnestness. His devotion to mediæval ugliness, asceticism, and dejection of spirit, is sincere, and has become a second nature; but what is in him true becomes in his followers mere affectation. Still, it is always well to see how far exaggeration and even affectation may be carried and find admirers. Besides the members of this school, however, several eminent or popular painters were invited. Mr. Watts contributed one of his grand allegories, "Time and Death;" Mr. Millais capital portraits of Mr. Hoare's two daughters; Alma-Tadema, some charmingly painted but uninteresting little pictures; Herkomer, a vigorous portrait of Wagner, the composer; and there was a little bevy of fashionable foreign painters, Heilbuth, Pellegrini, Ricci, Conti, Legros, Hallé, Schlosser, Otto, and one or two more. During the winter months there was at the Grosvenor Gallery a delightful loan exhibition of water-colour pictures, illustrating the rise and progress of the art in England, and of drawings and sketches by the older masters of all the chief schools—one of the best and best-managed exhibitions of the kind we have yet had in London.

The Winter Exhibition of the Royal Academy also had features of especial interest. In addition to the usual collection of paintings by the old masters, in which were included many fine por-

traits by Reynolds, Gainsborough, and Romney, a gallery was exclusively devoted to "works by the principal representatives of what is known as the Norwich School," and so admirable a collection of the landscapes of John Crome, and his pupils and imitators, was never before brought together. But in addition to these, which would have formed an invaluable exhibition in themselves, two rooms were filled with engravings in mezzotint selected from nearly all the most noted private collections of prints in the kingdom. The prints, about 350 in number, were mostly early proofs, and in excellent condition, and in looking over them it was easy to understand Sir Joshua's preference for this "the painter's style of engraving," especially when employed on the paintings of Reynolds and Gainsborough.

We have left ourselves no space to speak in detail of the other exhibitions. That of the Society of British Artists, if not worse, was no better than others which preceded it. But the Society has a new home now, and it may be hoped will make a fresh start. There is ample room for it, and with better management, it may yet do good service to British Art.

The Water Colour Societies were much as they have been during the three or four past years. English water-colour painting has lost its pre-eminence; it has not deteriorated, perhaps, but it has not advanced. The older painters seem too much disposed to rest satisfied with past successes, and the younger painters are rather fanciful than imaginative. Greater strength, more earnest endeavour, and a wider outlook are much needed. But in the exhibitions of the old Society of Painters in Water Colours, and the younger Institute, there were many beautiful and a few powerful pictures, and both exhibitions afford such a pleasant diversion that it would be ungracious to dwell on shortcomings. Another year may show us better things.

The Dudley Gallery had, as usual, some good landscapes; and the Black and White Exhibition many admirable drawings and etchings. One other exhibition claims a word of recognition for its thoroughly exceptional character—Mr. Ruskin's grand collection of Turner's drawings, and his own handiwork, illustrative of Turner. The Turner sketches and drawings covered or illustrated the whole period of the great painter's career from early boyhood till in the fulness of years the pencil dropped from his hand. The whole was full of interest and instruction, and with Mr. Ruskin's Notes was an unfailing fund of delight.

SCIENCE OF THE YEAR 1877–1878.

THE record of scientific discovery and progress during the past year might with ease be extended beyond the limits of the present volume. Every day almost has its tale to tell of the exercise of man's thought and ingenuity in compelling nature to reveal more of her secrets, or in adapting to the wants of the human race in some novel manner the natural powers and phenomena with which we are already acquainted. It will be obvious, therefore, that the space allotted in "the Companion to the British Almanac," for some account of the science of the year that is soon to pass away, will permit me to refer in the briefest possible manner to a very few only of the discoveries and inventions that have excited attention in the scientific world during that period. In making the selection of what to record, I shall be guided by the consideration that the fact or object should be one that can interest and be made intelligible to the general reader, and should also be capable of being described in ordinary popular language, and in a few words. Where inventions which were mentioned in my article on Science of the year 1876–1877, in the last "Companion" have proved capable of practical application, or have received further and more interesting development, I hope also to allude to them. The scientific student therefore will find many discoveries and researches that appear to him to possess primary importance and interest passed over in silence.

ASTRONOMY.

Determination of the Solar Parallax.—Towards the end of September of last year was issued the official report of the Astronomer Royal on the telescopic observations of the Transit of Venus in 1874. These observations when worked out gave a mean solar parallax of 8″·754, corresponding to a mean distance of the sun from the earth of 93,375,000 miles. Unfortunately these results have not been received by astronomers with implicit confidence. Previous to 1854 the estimated distance generally accepted and based on the observations of the transits of 1761 and 1769 was 95,365,000 miles; in that year, however, an estimate from measures obtained by independent methods was formed, reducing the distance by some four millions of miles, a result with which a re-examination (undertaken by Mr. E. J. Stone, of the Greenwich Observatory) of the measures obtained

in the transits of the last century agreed very closely. Other astronomers, however, were still dissatisfied with this result; Professor Newcomb, of Washington, deduced from six sets of observations by independent methods of great reliability a mean solar parallax of 8″·848, and Leverrier, the French astronomer, reasoning from the planetary theories obtained the value 8″·86, which differs very little from the former. Now the mean distance of the sun corresponding to Newcomb's parallax is 92,393,000 miles, and it was generally believed that the true value would be found to lie somewhere between 92,300,000 and 92,500,000 miles. It will be seen, however, that the value deduced from the calculations of Sir George Airy and his assistants is less than that obtained by the methods of Newcomb and Leverrier by nearly a million of miles. In a communication from Mr. Stone, now Royal Astronomer at the Cape, to Dr. Huggins, the ex-President of the Royal Astronomical Society, the solar parallax calculated from the observations of the transit of 1874, is given as 8″·88, corresponding to a mean distance of 92,000,000 miles, a value which agrees within $\frac{3}{100}$ths of a second with that obtained by the same astronomer from the measures of the transits of 1761 and 1769. It is to be hoped that further investigation may endorse the accuracy of the British calculations; unfortunately the photographic records which Sir George Airy confidently anticipated would confirm his results have proved to be unreliable. As mentioned in the "Companion" of last year, an expedition to Ascension Island was undertaken by Mr. Gill, for the purpose of determining the solar parallax by means of observations of the planet Mars. It is understood that the results he has obtained are excellent, but the observations have not yet been reduced.

New Minor Planets.—The rapidity with which discoveries of new planetoids have lately succeeded one another makes it exceedingly difficult to keep an accurate account of their number. In consequence also of the observers being distributed in all countries, and of the want of some central international authority to whom all discoveries could be reported, there is some confusion as to their sequence and dates, so that the calculation of the elements of the most recently detected planets is considerably behind observation. Thus the minor planet, No. 174, which in last year's "Companion" was reported as having been discovered on the 8th August, 1877, by Professor Watson, proved on comparison of the elements of its orbit to be the same body as

No. 141, which was first observed by M. Paul Henry, at Paris, 13th January, 1875, and had received the name of *Lumen*. As the result of this discovery the small planet found by Mr. Watson, on the 3rd September, came to be No. 174, and that by Herr Palisa, of Pola, on the 2nd October, was registered as No. 175. But, once again, the elements of this latter planet were seen, when the calculations were completed, to correspond with those of No. 161, *Athor* discovered by Mr. Watson, on the 16th April, 1876, so that it in its turn was deposed, and the one found on the 13th October, 1877, by Dr. Peters, of Clinton, New York (he has given it the name of *Idunna*), received its place. Another change, however, has still to be made; on the 5th November, Professor Watson wrote that his discovery of a planetoid on the 1st October had, through an omission, not been telegraphed to Europe. Thus it will be seen that this planet of Mr. Watson's must have the number 175, and Dr. Peters' Idunna, 176. On the whole the period between the end of Septenber, 1877, and the same date in 1878, has been tolerably prolific in the discovery of these heavenly bodies. The following tabular list contains all the minor planets found during that period, with their names, as far as I have been able to ascertain them :—

No.	Discoverer.	Place.	Date.	Name.
			1877.	
175	Watson	Ann Arbor, Michigan ..	October 1.	
176	Peters	Clinton, New York ..	,, 13	Idunna.
177	Paul Henry.. ..	Paris	November 5.	
178	Palisa	Pola	,, 6	Belisana.
179	Watson	Ann Arbor, Michigan..	,, 12.	
			1878.	
180	Perrotin	Toulouse	January 29	Garumna.
181	Cottenot	Marseilles	February 2	Eucharis.
182	Palisa	Pola	,, 7.	
183	,, ...	,, ...	,, 8.	
184	,, ...	,, ...	,, 28	Deiopeia.
185	Peters	Clinton, New York ..	March 1	Eunike.
186	Prosper Henry ..	Paris	April 6	Celuta.
187	Coggia	Marseilles	,, 10.	
188	Peters	Clinton, New York ..	June 26.	
189	,, ...	Clinton, New York ..	Sept. 18.	
190	Watson	Ann Arbor, Michigan ..	,, 22.	
191	Peters	Clinton, New York ..	,, 29.	
193	,, ...	,, ..	,, 30.	

The planetoid, No. 170, on last year's list, has received the name of *Myrrha*.

Comets of the Year.—Two comets of short period were expected to make their appearance in the course of the year 1878. The first of these, Encke's comet, is of great interest to astronomers

from the fact of its periodic time decreasing at every successive revolution. This phenomenon has been attributed to the existence of a resisting medium in which the planet moves, but lately doubt has been thrown on this explanation in consequence of no diminution being observed in the periods of other comets the circumstances of whose motion are similar. The comet was last seen on the 13th April, 1875, but it was observed with great difficulty, and only with instruments of great power. Its period at the last revolution was 1,200 days, and it was expected to be again in perihelion about the 27th July of this year, but its apparent track in the heavens would be unfavourable for observation. More probably it would be seen on its return from perihelion, that is to say, in the month of August, but then only by observers in the southern hemisphere. Up to the time of writing this account no notice of its having been seen has been received.*

The other comet, whose return to the neighbourhood of the sun was this year expected, is the one discovered by Dr. Tempel, at Milan, on the 3rd July, 1873. It had been calculated that its period would be 1,850 days, which would bring it into perihelion about the 20th July. When, however, it was discovered at the Arcetri Observatory at Florence, on the 19th July of this year, and when it was again observed by Professor Winnecke, at Strasburg, on the following night, a fresh calculation of its elements gave the 6th September as the time of its perihelion.

Subsequently to the enumeration of the comets of 1877, in last year's "Companion," a new one, being the fifth of the year, was discovered by Dr. Tempel at Florence, on the 2nd October. It is described as small and bright, with a tail. For the year 1878, up to the present, only one new comet has been observed, and that was discovered by Mr. Lewis Swift, at Rochester, New York, on the 7th July last. Owing to an error in the telegram announcing the discovery, its place in the heavens was wrongly described, so that it was not seen by observers in Europe, and when the correction was received it had already passed beyond the limits of vision.

Transit of Mercury.—This passage of the planet of Mercury across the sun's disc, which took place on the 6th May of this year, is the last event of the kind during the present century

* Since these lines were put into type, Mr. John Tebbutt, of Windsor, New South Wales, has sent word of his having re-observed the comet on the 3rd August last. The comet has now been seen on each occasion that it has returned to the sun since it was discovered by Encke nearly 60 years ago.

that can be observed in this country to any advantage. Of the three subsequent transits, that of 1881 will be wholly invisible here; in that of 1891, the egress occurs soon after sunrise; in that of 1894 it takes place near sunset. To observe the present transit, the French Government sent an expedition to Utah, in the United States of America, under the charge of two astronomers who had taken part in the expedition to New Caledonia, on the occasion of the transit of Venus, in 1874. In Europe, most of the observers of the event were under the disadvantage of unfavourable weather. Many of those who had a view of the planet concur in speaking of a ring, sometimes bright, sometimes dark, surrounding it; others observed a bright spot on its surface. Of these phenomena, if they be not subjective, no satisfactory explanation has yet been given.

Changes in the Moon.—On the 27th May, 1877, when examining the surface of the moon, Dr. H. J. Klein, of Köln, observed a large crater on the Mare Vaporum, close to the well-known crater Hyginus. As, in all the drawings of this region made by such accurate and practised observers as Schmidt, at Athens, and Mädler, at Dorpat, no such crater was shown to exist, the discovery of Dr. Klein tends to prove that changes, probably volcanic, are still taking place on the lunar surface. In April, 1878, Dr. Klein communicated his discovery to the Selenographical Society in this country, by whose members its correctness has been confirmed, in all important particulars. The apparent absence of an atmosphere in the moon had served to convince most students of science that our satellite is not fitted for the abode of living creatures, at any rate, of the nature of those existing on the earth. Not only so, but the want of evidence of a decided character of any signs of alteration on its surface seemed to show that the moon itself was in a quiescent condition, in which no physical change ever occurred. The discovery of Dr. Klein will, no doubt, give a stimulus to renewed investigation, from which we may obtain more accurate ideas of the nature of the forces at work within the moon.

Solar Eclipses.—The first eclipse of the sun in 1878 took place on the 2nd February. It was visible as a partial eclipse on the southern parts of Australia, and along its central line it could have been seen as an annular eclipse. But the line passed at such high southern latitudes that the annular phase could not have been observed to any advantage.

The total solar eclipse of the 29th July, on the other hand,

presented circumstances of much greater advantage for observation. Its belt of totality traversed the entire North American Continent, from Behring's Straits to the Gulf of Mexico, but the points of observation along this track are not so good and accessible as could have been wished. Denver City, in Colorado, is the only American town of any importance near the track of totality, and access to Denver City from most of the chief cities in America is by no means easy. The astronomers of the United States, however, to whom are due some of the most important discoveries of the century, were not to be deterred by any such difficulties. Naturally anxious to make the most of this magnificent opportunity for research in the region of solar physics, they set to work with a will, and, owing to their exertions, every facility was offered, not only to their own corps of observers, but also to numerous English savants, for travelling and transporting their instruments to the most favourable stations. From its height above the sea-level, where the atmosphere could be purer and the light clearer than in low-lying districts, the territory of Colorado was selected by most of the observers as the "coign of vantage." Favoured by most beautiful weather, the observers, on this occasion, have obtained results, both astronomical and physical, which will render the observations of this eclipse second in importance to none of its predecessors. To give a full account of these results would far exceed the space at my disposal here, and to discuss them would be out of place, as the most competent astronomers are not agreed as to their influence on the theories on solar physics. It must be sufficient to indicate, very briefly, the nature of the observations that were made, and their suggested bearing on recent discoveries.

One of the most striking observations recorded is the recognition, by Professor Newcomb, of the zodiacal light to a distance of six degrees, corresponding to about 10,000,000 miles, from the sun. By means of an elevated screen he shaded his eyes from the excessive brightness of the corona, and was able thus to perceive, on either side of the sun, the faint zodiacal light. Should the evidence of this important discovery be finally satisfactory, it will dispose of the theory that the zodiacal light is a phenomenon of our own atmosphere.

The appearance presented by the corona on this occasion differed in the most marked manner from that observed at the eclipse of 1871. Then the solar corona was observed to extend

nearly 700,000 miles from the sun, and the spectroscopic observation tended to prove its, at all events, partially gaseous constitution. But, on the 29th July last, the corona had shrunk in extent to a tenth, and had increased considerably in lustre. The evidence of the spectroscope, moreover, showed that the bright light with which the small corona of this eclipse was shining came from glowing solid or liquid matter. A further indication of the physical state of the corona was afforded by Edison's lately invented tasimeter, an instrument specially designed for estimating slight changes of tension, and therefore of heat. The observations taken with this instrument conclusively showed that the corona is hot. With regard to the red flames and prominences which have in previous eclipses been so conspicuous objects, the observations on this occasion confirm the evidence of the present comparatively quiescent condition of the solar surface. Only one prominence was observed, and this one was very dim, while there appeared to be an entire absence of the pink flames. Let us note, then, the differences between the phenomena observed on this occasion and those observed during the total eclipse of 1871, for it is on these differences that astronomers will endeavour to establish a theory of the physical condition of the sun. In 1871, a year when spots on the sun's surface were abundant, indicating great solar activity, the corona was expanded, comparatively lustreless, and consisted mostly of gaseous matter; the prominences and red flames were numerous and brilliant. In the present year, a minimum period of sun-spots, the corona was contracted and bright, glowing with a light coming from intensely heated liquid or solid matter, while the prominences were few and dim.

Among the triumphs of the observers at this eclipse is an astronomical discovery of great interest and importance. During the totality period, Professor Watson detected a new planet close to the sun, and some four or five minutes later the same object was seen by Mr. Lewis Swift. Here, then, we have, if all accounts be correct, Lescarbault's intra-Mercurial planet Vulcan, which, as mentioned in the preceding volume of the "Companion," was sought for so persistently, but without effect, last year. The descriptions of it, indeed, given by Messrs. Watson and Swift, seem to indicate its size as too small to account for the perturbation of the neighbouring bodies that Leverrier has ascribed to the influence of an unknown planet moving within the orbit of Mercury; this discrepancy may be got over, how-

ever, on the supposition of the existence of one or more companion planetoids forming a group; but this supposition, of course, still awaits confirmation.*

Geography.

Discovery of the Sources of the Congo.—At the time when the article on the Science of the year 1876–1877, in last year's "Companion," was passing through the press, Mr. Henry Stanley had just announced his arrival at Emboma, near the mouth of the Congo, on the West Coast of Africa, after following that river from Nyangwe, where under the name of Lualaba it had been known to Livingstone and Cameron. The value of the work so successfully completed by Mr. Stanley it is almost impossible to over-estimate. When he left Nyangwe, determined to solve the problem of the great river that flows past that place, he had nothing but the information of the slave-dealing Arabs to guide him—information which had been quite differently interpreted by his predecessors. Dr. Livingstone died in the belief that the Lualaba was connected with the Nile system; while Captain Cameron, though he proved from the difference of level the untenability of Livingstone's views, and surmised correctly that the waters of the Lualaba found an outlet in the Atlantic, was compelled to turn away from the great river, and to leave to other hands the task of confirming his opinions. The course of this mighty stream, as revealed to us by Stanley, can compare to advantage, as regards length and extent of country drained, with the largest rivers of either hemisphere. Taking its origin to be the Chambeze, it rises not far from Lake Nyanza in about 30° E. long.; flowing through Lake Bemba and Bangweolo (where Livingstone laid himself down to die), and Lake Moero, past Kamolondo and Nyangwe, its continue its northerly course to a point two degrees north of the Equator. Here from the east it receives a large tributary, which it is thought must be Schweinfurth's Welle, and turning abruptly to the south-west it falls into the Atlantic, where it is known as the Congo or Zaire. Its entire length, as calculated by Stanley, reaches 2,900 miles, and its basin he estimates at 860,000 square miles; while, according to the observations of the late Captain Tuckey, it discharges into the ocean 1,800,000 cubic feet of water per second. Naturally, a stream of this extent and volume should form a magnificent waterway into the interior of the continent. At

* From the latest accounts it would appear that Watson really saw two planets.

some 150 miles above its mouth, it is true, it descends over a series of rapids or falls; but beyond that, for 800 miles, its course resembles that of a winding lake, rather than the contracted bed of a river. Passing, as it does, through a variety of peoples, who have no common language, and very little intercommunication, it is to be expected that the river would be known by many different names in the various parts of its course. Mr. Stanley proposes, in memory of his great master and fellow-labourer, to designate it the "Livingstone," but it will probably be difficult to dissociate from it the name of "Congo," by which it has been so long known on the West Coast of Africa.

Other Explorations in Africa.—During the year several expeditions have been organised, as well from this country as from Germany and Italy, for the exploration of different parts of the African continent, but though we hear of their progress, effected in some cases with loss of life among the leaders of the party, no results have yet been ascertained of which a succinct account could be given. Apart from the exploring expedition organised by Colonel Gordon, who, in the service of the Khedive, is endeavouring to open up to European influence and civilisation the whole of the lake country at the head waters of the Nile, the Committee of the African Exploration Fund of our own Geographical Society have determined to dispatch an expedition to Lake Nyassa. This exploring party, which is to be under the charge of Mr. Keith Johnstone, will start from Dar-es-Salaam, on the east coast of the continent, some miles further south than Zanzibar, and will endeavour first to survey a practicable road between that point and the Lake Nyassa. It will then proceed northwards to Lake Tanganyika, and return probably to the coast by the Luindi.

Arctic Expeditions.—As might have been expected, the return last year of the English expedition to the North Polar Seas has stimulated further research in that direction. On the 6th May last a Dutch expedition left Ymuiden on a six months' cruise in the Arctic Ocean. That this expedition is entirely on a small scale—the ship in which it sails is a little schooner of 80 tons, appropriately named the *Willem Barentz*, and manned by a crew of eight men, or with officers and scientific experts, fourteen hands all told—will probably not detract from the value of its scientific results. It has been organised exclusively by means of voluntary contributions from the Dutch people, with the object of visiting Jan Mayen Island, Spitzbergen, and Amsterdam Island, and

tracing the relics and graves of the Dutchmen who made so many discoveries in these regions in the seventeenth century. When news was last received from the members of the expedition, they were at Vardö on the north coast of Norway, having accomplished the main object of the voyage. It was then their intention to cross the Barentz Sea, so as to reach Novaya Zemlya towards the middle of August.

Professor Nordenskjöld, a veteran Arctic explorer, left Tromsoe on the 15th July, in command of a Swedish expedition, with the object of reviving the attempt to discover a north-east passage, that had been abandoned as hopeless nearly 300 years ago. The *Vega*, as the ship is named in which the expedition sailed, is under the command of Lieutenant Palander, and is provisioned for two years; but if the state of the ice be favourable Nordenskjöld hoped to reach Behring's Straits before the end of September.*

Chemistry.

Artificial Production of Precious Stones.—At the end of last year M. Feil, the well-known manufacturer of optical and other fine glass, in conjunction with M. E. Fremy, brought before the notice of the French Academy of Sciences a number of rubies and other precious stones that they have succeeded in producing artificially. It has been long known that corundum is merely crystallised alumina, and that ruby and sapphire are the same substance, coloured by the presence of various metallic oxides. By submitting pure alumina in large quantities to the action of a furnace under certain conditions, MM. Fremy and Feil obtain crystals of corundum; by adding oxide of cobalt and a little bichromate of potash, sapphire; and with the addition of a larger quantity of the latter salt, ruby. Jewellers, who had been accustomed to deal with paste and fictitious precious stones, denied that the real gems could possibly be produced, except in the laboratory of nature, and assumed that these crystals must have been manufactured by one of the many ways with which they were familiar. But these products of the French chemists are really and truly as much sapphires and rubies as the precious stones that are dug out of the mine: they have the same hardness and density, though perhaps not quite so much brilliancy as

* The latest news received at Stockholm represents the expedition as having reached the mouth of the Yenissei on the 6th August. It was then intended to start afresh on the 10th, with a good prospect of success.

the natural gems, and they can be cut and set in the same way as these.

Artificial Indigo.—When in 1868 the German chemists Professors Graebe and Liebermann succeeded in preparing from anthracene, one of the coal tar products, the brilliant dye stuffs hitherto yielded only by natural madder, the result was universally regarded as a triumph of chemical synthesis. Real alizarine, in fact, the colouring principle of the vegetable madder, had been obtained by a chemical process from the mineral anthracene. Fortunately in the interests of the dyeing industry the process of Messrs. Graebe and Liebermann is perfectly practicable on a large and commercial scale, so that the manufacture of artificial madder bids fair to entirely supersede the preparation of the natural product. Until the spring of this year this invention remained the only instance of a colour occurring in the vegetable kingdom being artificially prepared, but we have now received intelligence that Professor A. Baeyer, of Munich, has succeeded in solving a similar problem as regards indigo. It has long been known that indigo blue, or indigotine, from its formula and the products of its decomposition, was closely allied to the benzene series of compounds obtained from coal tar. Starting from phenylacetic acid, one of this group, Professor Baeyer has succeeded in building up the real indigotine by a series of steps, which are too technical to be explained here. The operations by which he effects this are too numerous and costly to permit of any hope being at present entertained of the practical application of this ingenious discovery. It remains a curiosity of the laboratory until a method of shortening and cheapening the process shall have been found, so as to make the artificial production of indigo commercially successful.

A new Mineral White Pigment.—Before the Chemical Section of the recent meeting of the British Association at Dublin, Dr. T. L. Phipson read a paper on a new white paint obtained from zinc. For many years past chemists have endeavoured to find a substitute for carbonate of lead, or white lead, in the preparation of common white paint; for white paint containing lead turns rapidly black when acted on by the sulphur of coal gas. Zinc compounds, such as the oxide and the silicate, have been suggested, but the former of these is very costly to produce, and the latter is found not to have the body or covering property of lead carbonate. Lately, however, Mr. T. Griffiths has obtained a new mineral white from zinc sulphide, which is

found not only to surpass the old zinc white (oxide of zinc) in brilliancy, but to be superior in covering power to white lead itself. It is prepared by precipitating, under certain precautions, either sulphate or chloride of zinc by means of a soluble sulphide; the precipitate is dried and calcined in a furnace, and then raked out and levigated in cold water. The result is an oxy-sulphide of zinc, which is the pigment in question. It possesses the advantage of not being prejudicial to the health of the workmen who use it, and as the process of manufacture is said to be capable of being carried out on a large scale at a comparatively low cost, it will probably be introduced with success into commerce.

Geology.

The Fossil Vertebrata of America.—The magnificent palæontological discoveries of Professors Marsh and Cope in North America have made us acquainted with a large number of extinct vertebrate animals which had previously been quite unknown to science, and which serve in many instances to bridge over the gaps that appear to exist between forms of animal life that at first sight appear to have no relationship whatever. Among the marvellous beasts whose bones have been disinterred by these geologists are the *Diceratherium*, a rhinoceros with two horns placed transversely, and the *Dinoceras*, somewhat allied to the elephant, but with six horns arranged in pairs. More especially rich in fossil remains have been found to be the cretaceous beds of the Rocky Mountains in the state of Colorado. Here have been discovered huge lizards belonging to the Mosasaurian and Pterosaurian families, and birds like the *Hesperornis* and *Ichthyornis* possessing veritable teeth, forms that connect the order of Aves with that of Reptilia. Quite recently in what are called the Dakota beds, lying between the jurassic and cretaceous strata of this region, and thus corresponding to our own Wealden formation, Professor O. C. Marsh discovered the bones of a gigantic Dinosaurian larger by far than any land animal known to have ever existed on the earth. This monster, to which its discoverer gave the name of *Titanosaurus*, must have been from 50 to 60 feet long by 30 to 40 feet high, and it became a matter of interest to know how so huge a creature could sustain its own enormous weight and move about freely. The answer to the question is found in the fact that its bones were hollow, and its vertebræ, like those of birds, furnished with cavities into which air was admitted.

Physics.

Liquefaction of the Gases.—In the calendar of scientific progress the close of the year 1877 must be marked with a white stone; it has been signalised by a series of brilliant researches demonstrating the absolute truth of the doctrine that all bodies can be made under certain conditions to assume the solid, liquid, and gaseous states. When the previous volume of the "Companion" was published there were still five gases which had resisted all efforts to reduce them to the liquid state, so that it had become the fashion to speak of them as permanent gases. Early in December, 1877, M. Cailletet, an ironfounder of Chatillon-sur-Seine, succeeded in rendering liquid two of these gases, carbonic oxide and nitric dioxide, so that the number of so-called permanent gases was reduced to three, namely, oxygen, hydrogen, and nitrogen. On the 23rd December, the *Journal de Genève* gave an account of the successful experiments of M. Raoul Pictet of Geneva, resulting in the production of liquid oxygen. M. Pictet employed the process of generating great cold by the circulation of liquid sulphurous acid which he uses in his ice-making machine. By means of it he obtained a sufficient cold to produce solid carbonic acid at a temperature of $-140°$ C.; and into the midst of this was introduced an enormously strong tube in which oxygen is generated at great pressure. One end of the tube was provided with a stop-cock, and on the pressure registering 320 atmospheres the stop-cock was opened, when a stream of liquid oxygen shot out with such violence that none of it could be secured. This discovery of M. Pictet's was made on the 22nd December, but when it was announced to the French Academy of Sciences, it appeared that M. Cailletet had already effected the liquefaction of oxygen on the 2nd of the same month, though the description of his experiments were not at once communicated to the Academy, but were sent in "sealed." The apparatus used by M. Cailletet for liquefying the gases is much simpler than that of M. Pictet; it consists essentially of a tube resting in a massive steel cylinder full of mercury, the cylinder being surrounded by a freezing mixture. Strong hydraulic pressure compresses the gas to be experimented on into the tube, and when subsequently allowed suddenly to expand into the air, the absorption of heat on the change of condition is so great as to condense a portion of the gas to a liquid state. In point of time, as we have seen, M. Cailletet's discovery has the priority over that of

his rival, but each pursued his experiments independent of and quite unknown to the other. As far as oxygen is concerned it should also be noted that the Frenchman observed it in his first experiment in the form of a thick fog, indicating its existence rather as that of a vapour very near its point of liquefaction, whereas the Swiss, as has been already stated, obtained it in a liquid stream. On the last day of the old year at the Ecole Normale at Paris, in the presence of Boussingault, St. Claire-Deville, Berthelot, and several other French physicists, Cailletet succeeded in compressing the two other gases, hydrogen and nitrogen, as well as atmospheric air, into a liquid form. With a pressure of 200 atmospheres the nitrogen was obtained as drops, but with one of 280 atmospheres the hydrogen appeared only as a faint mist. Finally, the crown was placed on this series of discoveries on the 11th of January, 1878, when M. Pictet, by means of the apparatus already briefly described, and with the enormous pressure of 650 atmospheres, and at a temperature of possibly 170° C. of cold obtained a jet of liquid hydrogen of a steel blue colour, which fell with a metallic sound into the tube placed to receive it.

Discoveries in Acoustics.—The invention by Dr. Graham Bell of the telephone, as described in last year's "Companion," was followed this year by that of other very remarkable instruments for the transmission and registering of sound. Mr. Edison's phonograph, and Mr. Hughes' microphone form, with Dr. Bell's telephone, the introduction into a new field of acoustical science of which we have no means of seeing the farther limits. As these instruments form the subject of a separate article in this volume, it will not be necessary to allude further to them here.

Invisible rays at the red end of the Spectrum.—As photography in the hands of Sir J. Herschel, Becquerel, and the elder Draper had been, nearly thirty years ago, the means of demonstrating the action of solar light a long way beyond the extreme violet of the spectrum that could be seen with the eye, so in the spring of this year it has been used by Captain Abney, F.R.S., to prove the action of light far beyond the red or least refrangible end. With ordinary silver salts it has hitherto been found impossible to photograph the spectrum towards the less refrangible end further than the Fraunhofer line E in the green. The younger Draper, by a peculiar arrangement, was able to take a photograph of the spectrum extending beyond the extreme limit of visibility in the red end, but the picture was reversed, the

lights and shades being transposed. Captain Abney, however, has succeeded in obtaining unreversed photographic pictures of the solar spectrum extending far beyond the Fraunhofer line A, the first visible strong line in the red. His photographs show as great an extension below A (reckoning from the red to the violet as upwards) as the distance from A up to D in the yellow, and contain very marked groups of well-defined lines. It should be noted that what are called the ultra-violet rays, which had first been manifest, as explained above by photography, were made visible by the researches of Professor Stokes; by his discovery of the peculiar phenomenon that has since been called fluorescence, he obtained a visible spectrum of the violet rays seven times as long as the whole spectrum that had previously been seen. But Abney's ultra-red rays cannot be seen in the spectroscope; they manifest themselves only by their action on the salts of silver.

Biology.

Underground Monsters.—A German gentleman, resident in Brazil, Herr Fritz Müller, has lately been at the trouble of collecting and sending home the accounts of the appearance of a gigantic earthworm in the highlands of the southern provinces of that empire, where it is known under the name of the "Minhocao." Though the animal itself has been only once or twice observed, the burrows that it throws up—for it seems to live underground—have often been seen, and apparently on good authority. These signs of its existence include such appearances as huge trenches, some three metres broad, that have been traced for a distance of from 700 to 1,000 metres, and large trees undermined and overthrown; also rumblings of the ground like subterranean thunder have been heard. The accounts of those who profess to have seen the creature describe it as an enormous black worm-like animal covered with hard scales, and having a snout like that of a pig with two horns on its head. It appears, too, on the authority of Dr. Spencer Baird, of the Smithsonian Institute, that the belief in such a monster is not confined to Brazil, but is shared in by inhabitants of the neighbouring Nicaragua; and these reports of what they have seen agree very closely with those of the Brazilians. If all these stories are to be accepted, they appear conclusive of the existence of some large animal of subterranean habits as yet unknown to science; possibly it may be a gigantic fish allied to the *Lepidosiren*, which, like its congener, can live for a time on land. It has been suggested that

the Minhocao may be a relic of the race of gigantic armadilloes, which, in past geological epochs, were abundant in Brazil, a supposition which the scales that are said to have been observed on the animal would serve to confirm.

Artificial transformation of the Salamander.—Some very interesting experiments of Madame von Chauvin tend to show how the specific characteristics of animals come to vary under altered physical circumstances. The young of the Alpine or black Salamander possess large gills while within the body of the mother, but are born to commence at once a land life, while other species of the same family, especially the spotted Salamander (which is found in adjacent though lower lying districts where water abounds), brings forth its young with gills, and they pass a large portion of their early life in water before taking to the land. Among several larvæ of the black Salamander which she took from the body of the mother before the normal period of birth and placed in water, Madame von Chauvin succeeded in feeding and rearing one so as to resemble in its first characteristics the full born young of the spotted species. Soon after being placed in water the old gills shrank and fell off; but new and larger ones were at once produced, enabling the creature to live in the water until it had attained the age of fourteen weeks; the new gills then in their turn disappeared, the skin was shed, and the animal with a normal black and wrinkled skin commenced a new life as the ordinary black Salamander. Judging from this experiment it appears highly probable that the Alpine and spotted Salamanders were at no very distant period of time one species, and that, as physical conditions changed, one variety became gradually more adapted to an elevated and rocky dwelling-place where water for the early life of the young is not readily found.

Mechanics.

Cleopatra's Needle.—The adventures of the cylindrical ship *Cleopatra* and its freight, since they were described in the article on "Science of the Year 1876–1877," as well as the disputes as to the site where the obelisk should finally be set up, will be fresh in the memory of our readers. A brief description of the machinery for raising and placing it on its pedestal, which, as a novel problem in mechanics, belongs more to the scientific side of the question, will be all that is necessary here. When the top of the Adelphi Steps, on the Victoria Embankment, had

been finally settled as the site for the monolith, the cylinder and its contents were towed alongside and landed on a timber cradle that had been prepared for it. They were then lifted by powerful hydraulic jacks, and at the same time moved forward and sideways until the obelisk lay across the centre of its pedestal. The next step was to cut away the iron cylinder in which the voyage had been made, and at the same time about 20 feet of the central part of the stone was cased in an iron jacket, which, to prevent its slipping when the obelisk was in an erect position, had an iron strap passing round the base and fastened to each side. Protruding from the jacket were two arms like the trunnions of a cannon, and these rested on two iron girders; a scaffolding, formed of four uprights, each consisting of six baulks of timber, was erected to support the girders, their ends fitting into the spaces between the timbers. Hydraulic jacks were then placed underneath the girders and the whole mass was lifted—the height gained being secured by solid timber packing—until the centre of the stone was at the same height above the pedestal as the distance between the base and the trunnions; the obelisk was then allowed to swing on the trunnions into a vertical position. On the 12th September, Cleopatra's Needle was finally placed in position; all that now remains to be done is to cut away the iron jacket and strap, and when the scaffolding is removed the obelisk will be added to the monuments that adorn the metropolis.

The Tay Bridge.—The new railway bridge across the Tay, at Dundee is one of the latest triumphs of modern engineering. Not only the breadth and depth of the river to be crossed—the bridge is the longest structure of its kind in the world—but the peculiarities of its bed, and the nature and extent of the traffic carried on its surface presented difficulties which taxed the ingenuity and mechanical skill of the engineers to the highest degree. As completed, the bridge consists of 85 spans, varying in length from 27 to 245 feet, forming a total length of 2 miles within a few yards. At the highest part the 7 central spans are level and are placed so high that they offer a clear waterway of 88 feet at high-water mark. With the bed of the river varying in depth below the water surface and also in geological character, the piers which supported these spans could not be all of the same structure and design; in fact, the construction and erection of the piers form the great point of interest in the work. Some have a rectangular section, others are oval in shape; some are

single others are double piers; some consist of brick and stone work from the foundation, and others are formed of iron cylinders cased internally with brick and filled up with concrete; and again others consist above high-water level of iron columns braced together. One of the great peculiarities of the work of erection was the fact that no scaffolding or staging was used, as is commonly the case in works of this nature; as a rule, the building operations were conducted on shore. Level foundations of concrete and stone were constructed on the foreshore, some of which were used to put together and rivet the iron caissons forming the outer shell of the piers, others to build the brick-work for that part of the piers between the river bottom and low water. When the caissons had been put together and the brick-work built in, they were floated out by barges to the places assigned for them, and then lowered by means of hydraulic rams. Where the bottom was clay, the piers were sunk into it by the pneumatic process until they reached the rock below. Where the bottom was hard, piles were driven into the ground inside the caissons, and after the piles had been cut off by a diver, leaving 3 feet standing, the interior was filled up with concrete. Where the piers had to rest on a sandy bottom, the caissons were floated out and sunk as above described until they reached the hard gravel, and the sand inside was then sucked out by a stream of water; a pit was thus formed in the sand, the sides of which were kept up vertically by the caisson, while the bottom consisted of a layer of hard gravel; this pit was then filled in with concrete, which, when it hardened, became like a level rock on which the superstructure could be raised. The works in connection with the bridge were commenced in July of 1871, and the last pier was floated out on the 26th December, 1876. In February of this year the structure was severely tested by the Inspector of Railways, the test consisting in placing on each of the larger spans a train weighing 360 tons, and running it over the whole bridge at considerable speed. It is calculated that the greatest load to which the spans will be subjected cannot, in ordinary working the railway, exceed 162 tons; nevertheless, under the excessive test load the deflection of any of the spans did not exceed the calculated limit.

J. F. Iselin.

THE MUSIC OF THE YEAR 1878.

THE attempt to gauge musical progress, whether from the national or the cosmopolitan standpoint, presents features of difficulty which necessarily belong to any effort to assess the merit of art work; for, in a very great degree, we have to deal with the abstract and the intangible, and not, as in the case of scientific inventions or discoveries, with that which, by its fitness for certain uses, or by meeting some of the world's necessities, proclaims its own value by its results. But while this holds good as to any survey of "music in its art mysteries," to use the somewhat involved term which the present Professor at Gresham College once placed upon the title pages of his annual lectures, the art has its practical side; and although a score, like a picture, may present to different minds the most varied impressions, and doctors may differ widely as to its merits, there is, after all, much in a year's music-making that can be brought down to the region of fact, and can be taken as a tolerably fair index of progress or retrogression. Leaving to others, then, the task of deciding upon the particular worth of the new works added to the libraries of our opera houses and societies—and on these the judgment of posterity is, after all, the only trustworthy guide—we can, in the light of the actual doings of the past year, judge with tolerable accuracy as to the character of the movement which has taken place.

And first, in the cultivation of a more intelligent appreciation of the art, there are signs of a distinct advance. Leaving, for the moment, the education of those who are intended to become teachers or professional musicians, there is in the growth of musical literature a gratifying evidence of the devotion of thought and interest to what was formerly regarded either as beyond the capacity of the multitude or as being unworthy of the expenditure of time or concentrated labour. This, at any rate, is a case in which we may assume that the law of demand and supply is at work; and when we find such books as Dr. Grove's "Dictionary of Music and Musicians," Novello's "Music Primers," and numerous works of history, biography, and criticism, issuing from the press, we have the right to argue that music is occupying a higher place than heretofore in the public regard. The number of persons who can write intelligently on the art is still far smaller than it ought to be, a natural result

of that mistaken system which in the past made music itself almost the only subject of education among those who "professed" it; but there is a clearly marked increase in the number of writers qualified to treat of music and musicians, and as the demand increases the supply will doubtless keep pace with it. Scarcely less satisfactory is the higher position which is gradually being accorded to music in our Universities and in our public and private schools. At Oxford and Cambridge, the new rules, which require candidates for musical degrees to show a more satisfactory proof of proficiency in other gentle arts than was afforded by a testimonial as to general education from some benevolent graduate, are now in active operation; while, at London University, the exercise, for the first time, of the powers already possessed by the Senate of granting musical degrees will be concurrent with the enforcement of regulations which effectually exclude uneducated persons from the list of graduates in the faculty. Whether the preliminary arts examination at Burlington House is not as much too severe as the provisions formerly existing at Oxford and Cambridge were too lax, is open to question; and this is not the only point which has evoked criticism. The prominence assigned to acoustics, and what may be termed the mathematics of music, in the scheme has also been objected to by Dr. Hullah and other eminent men, who hold that the attainment of a knowledge of the abstruse "science," as distinguished from the art of music, although desirable, is not essential, and therefore that it ought not to be imposed as an inevitable condition for obtaining a degree. Some idea of the extent to which the examination is to be carried in this special direction may be formed from the following list of subjects for the first Mus. Bac. examination:—The relations between musical sounds and the vibrations of sonorous bodies, as affecting the *pitch* of the sounds. The simpler properties of stretched Strings, and the Sounds produced by them. Compound Vibrations. Nodes. The nature of Harmonics. The general theory and simpler phenomena of Compound Sounds. The theoretical nature and values of Musical Intervals. The theoretical construction of the Modern Scales. Temperament. Melody. Time. Rhythm. The theoretical nature of Consonance and Dissonance as determined by Helmholtz. The principles of the Construction of Chords. The History of Music, in so far as it relates to growth of Musical Forms and Rules. Candidates are not to be approved by the examiners unless they have shown a competent know-

ledge in each of the foregoing subjects. For the second examination for the Bachelor's degree, every candidate is required to submit to the Registrar, before the examination, a musical exercise, clearly and legibly written in the proper clefs, at such length as to occupy from 20 to 40 minutes in performance, and fulfilling the following conditions :—(*a.*) It must be a Vocal Composition to any words the writer may select. (*b.*) It must contain real five-part Vocal Counterpoint, with specimens of Imitation, Canon, and Fugue. (*c.*) It must have accompaniments for a quintet stringed band. The candidate will be required to make a solemn declaration that the exercise is entirely his own unaided composition. If the exercise is approved by the examiners, the qualifications of the candidate will be further tested by an examination in the following subjects :—Practical Harmony and Thorough Bass. Counterpoint, in not more than five parts, with Canon and Fugue. Form in Musical Composition. Instrumentation, so far as is necessary for understanding and reading a full score. Arranging for the Pianoforte, from an instrumental score. A critical knowledge of the full scores of such standard Classical Compositions as shall be announced beforehand. It will thus be seen that the first examination deals almost exclusively with music as a science ; and we are not surprised to find that the action of the Senate in allowing such a turn to be given to the scheme should have excited considerable opposition. Dr. Hullah, writing to Dr. Pole, who is understood to have been chiefly instrumental in this formulation of the syllabus, makes his protest in the following forcible terms : "Music is a fine art, and of every fine art there is a science. In what this particular science of musical art consists it is needless for me to stop to tell you. But it is not needless to name one subject or science which, though seeming (to men of science who are not musicians) to belong to it, is practically altogether outside of it, the science of acoustics. You know me well enough to render it unnecessary that I should protest against being supposed to undervalue a knowledge of acoustics, or indeed any kind of knowledge whatever. All knowledge is valuable and venerable. That a musician should make acoustics a subject of study is laudable, as would be his making astronomy. But the former has, so far, had no more practical bearing on what musicians call music than the latter; and I am unable to see that you have any more *right* to demand of a musical candidate an acquaintance with the one than with the other. Can you name

a single great composer, from Josquin Depres to Sterndale Bennett, who could have passed your first examinations? Would he have been a better 'musician' if he could have done so? Acoustics seem to me to stand in the same relation to music as does philology to poetry, chemistry to painting, geology to architecture, or even anatomy to sculpture. In what way has philology or chemistry affected the works of the great masters of verbal expression, design, or colour. Can it be denied that the noblest structures the world has yet seen were completed ages before geology, as a science, had an existence or a name? And is there the slightest evidence that Phidias had any acquaintance with the parts of the human body which were not open to his observation? Really, it seems to me as unreasonable to demand of a musician, as you propose to do, an account of the theories of Helmholtz—propounded, observe, more than a quarter of a century after music had attained its highest conceivable perfection, in the works of Beethoven—as to demand of a painter an account of the anatomy and habits of the hog, with the aid of whose bristles he will certainly have to express himself to the end of his days. But your scheme is not only redundant, but, as I have indicated, deficient. I cannot but think that more credit than you propose to give should be given to technical skill. In omitting or excluding this from the number of qualifications for a musical degree, you ignore the best qualities of the musical artist. Sentiment, expression, refinement, made manifest in touch and tone, are all to go for nothing! The business of ninety-nine musicians out of every hundred is to render or expound the works of others. You ignore every gift or accomplishment which will enable a musician to do this. The greatest executant, instrumental or vocal, the world ever heard or saw, might utterly fail in your proposed examination."

Such a protest from a man who has done more than any other musician in the present generation to advance popular musical education, is, it must be admitted, formidable in itself, and it only remains to be seen whether when the examinations actually commence (the first takes place in December, 1878), the views of Dr. Hullah will not be amply justified by the unwillingness of students, and even of musicians of proved ability, to present themselves for an examination which requires the peculiar knowledge of a man who in medical circles would be described as a specialist. The names of the examiners in the faculty have not yet been announced, and much will of course depend upon their

selection, but at the outset the objections raised by Dr. Hullah, and those who think with him, seem to have much justice. If the scheme should thus fail, the process of amendment will not be difficult, and at any rate it is satisfactory that we are at last able to report that in Oxford, Cambridge, and London the possession of a musical degree will henceforth imply, as, owing to. Sir Robert Stewart's action, it has long implied in Dublin, that its holder is not only an adept in his own art, but a man of general culture.

Turning from the Universities to the purely professional schools, we find that at the Royal Academy of Music the number of students at the commencement of the winter term was 365. At the National Training College at South Kensington the number of scholarships subscribed for is 89, and the actual number of students when work was recommenced in October was also 89. A proposal, emanating from South Kensington, for a fusion with the Royal Academy is now under consideration, but it is difficult to see why the older school—the only institution, be it remembered, which has received national recognition in the form of a subsidy from the State—should be asked to sink its identity in order to provide a dignified apotheosis for a scheme which from the first was in fact, if not in name, a rival to the existing body. The principal of the Royal Academy of Music is a member of the committee which, under the presidency of Prince Christian, is considering the establishment of what is termed a "Royal and National College of Music," and therefore it may be presumed that he will protect the interests of the time-honoured Academy; but at the same time the fact cannot be disguised that the suggestion for the fusion is in itself a confession of weakness on the part of the promoters of the South Kensington School, and there is no reason to anticipate that they will be more successful as the managers of "A Royal and National College of Music"—a title, by the way, in no wise preferable to "The Royal Academy of Music"—than they have been in establishing what they so unhappily described as "The National Training School *for* Music." The College which they now seek to set on foot can only be regarded as their original scheme under another name, and while it must be patent to everyone that no good end can be gained by maintaining two institutions devoted to almost identical work, it is equally obvious that if the funds spent upon the formation of the South Kensington school had been sent to the treasury of the Academy, it would have been

supplied with the chief element which has always been wanting to secure its extension and its more complete success.

Looking next at the schemes for extending and more particularly for testing musical education among the people, the work of Trinity College, London, claims notice. The College having, as noted in the "Companion" for 1878, resolved to establish on a large scale the elementary examinations in music conducted for some years by the Society of Arts, the scheme has now been fully tried, and the results are most encouraging. The examinations are held at a large number of centres, and are conducted under conditions which give a real and substantial value to the certificates granted to the successful candidates. The College has also instituted examinations for women, which have already attracted a considerable number of candidates. The actual result arrived at by the application of a sound test of knowledge to those who present themselves for examination, does not, of course, represent all the advantages which are secured, as every candidate who passes may fairly be held to represent many whose studies have been stimulated and quickened. The interest excited in the various districts when prizes are given cannot fail to promote the work to which the Earl of Rosebery referred in a recent speech at Falkirk, when he strongly urged that it was the duty of the State, and consequently of all who are in positions of authority, to help forward national musical education. We are as yet, as the noble Earl pointed out, very far from realising the power of music as an agent in promoting civilisation and elevating the popular taste; but if such agencies as these local examinations can be more widely established, a change for the better will soon be effected. As an illustration of the strong interest which can be excited by this apparently simple and inexpensive means, we may instance the case of the Gloucester centre, where at the recent distribution of prizes not only was there a gathering of the most influential inhabitants of the city, but the bishop of the diocese, Dr. Ellicott, gave an address of singular eloquence, in which he insisted on the high function of music in calling to the surface the better and nobler feelings of humanity. Almost at the same date, at the meeting of the National Eisteddfod, corresponding testimony was borne by a member of the House of Commons, Mr. Osborne Morgan, who spoke of the benefit to be gained from the cultivation of music in similar terms. With such facts before us there is ample ground for encouragement, for not only is the diffusion of a know-

ledge of music taking place in all parts of the country, but members of both houses of the legislature are uniting to bear witness to its value as an agent in promoting the welfare of the nation.

As regards the musical education of the children in the primary schools of the country, we have in the annual blue book of the Education Department a picture of growing activity, and the value of the inspector's periodical visits and examinations at the training colleges is shown by the increased number of students of whom he is enabled to report satisfactorily. Dr. Hullah has pressed upon the Committee of Council the importance of making sight-singing, and not mere singing by ear, the condition of the Government grant for music in all elementary schools, and the adoption of this proposal can only be a question of time. At present, as far as the promotion of *bonâ fide* musical education is concerned, the grant is practically of little value; in fact, Dr. Hullah, with that freedom which distinguishes the reports of inspectors of schools from all other documents prepared by Government officials, says that at present "time and pains have to be wasted on a mere sham, for that singing by rote instead of by note is, from a musical point of view, a mere sham, is indisputable." As matters stand, the country pays from 90,000*l.* to 100,000*l.* every year for this so-called musical education of the children, with a result which is certainly not "most musical," and, on the contrary, if we may judge by the inspector's reports, is occasionally "most melancholy." Dr. Hullah's remedy is to employ efficient musical inspectors to visit the various schools and to confine the grant to those cases in which sight-singing is really taught. Dr. Lyon Playfair is, it is understood, likely to bring forward during the next session of Parliament a scheme for carrying out this plan, and Dr. Hullah is very sanguine as to the result of the adoption of his scheme. "An addition," he writes, "insignificant in relation to the public grant for education would, in a year or two, turn this sham (the present system of paying for rote-singing) into a reality, and in a few years more put within reach of the working classes a means of recreation in which their families would be able to take part with them, and which would more than any other conceivable thing serve to refine and beautify their domestic life; for it is the glory of music—a greater glory, I think, than it can attain through even its most skilful public manifestation, that it can at a smaller cost than through any other art, refine and beautify domestic life, and so furnish us with

our best ally in the long battle that has still to be fought against strong drink and all its attendant miseries, moral and physical, to the drinker and his belongings." These, be it remembered, are the words not of a mere theorist or enthusiast, but of a cultured and thoughtful man who has devoted his life to the popularisation of the art of which he speaks with so much confidence and affection, and it can scarcely be doubted that if the matter were put fairly and fully before the House of Commons and the country on such grounds as these the necessary expenditure would be authorised. Something more, however, than musical inspection will be required, and it will be in the supply of teachers qualified to instruct the children that difficulty will be experienced for some time to come.

In the sphere of musical investigation the "Musical Association" whose foundation in 1874, and subsequent annual proceedings have been duly noted in these pages, has continued its useful work. In the course of the session 1877–78, the papers read dealt with a wide variety of subjects, some exclusively abstruse and technical, such as Mr. William Chappell's paper on "Music, a science of Numbers," Mr. Blakeley's communication "respecting a point in the theory of brass instruments," and the essay of Mr. Alfred Rhodes, "On a Practical Method for Reading Harmony;" while others were directly practical, including the plea of Mr. W. H. Cummings, for the "Formation of a National Musical Library," Mr. Helmore's "Suggestions for a more expeditious Mode of Writing the Time-notes in Music," Mr. J. Spencer Curwen's paper, on "The Laws of Musical Expression," and Mr. Charles Mackeson's on "The Present Cultivation of Sacred Music in England." Mr. Cummings wishes to make the existing musical library at the British Museum the nucleus of his proposed national musical library, and we are inclined to think that he is in the right. The attempts which have been made to shift the centre of London from its present point have practically failed, and a library at such a suburb as South Kensington would be of comparatively little use. The proposal of the well-known artist met with very general approval, and will, it may be hoped, bear early fruit, for as matters stand London is in this respect far behind some of the continental cities.

In the musical performances of the year there have been but few features worthy of special note, and as far as the metropolis is concerned not a single new society, whether for vocal or instrumental practice, has been formed, and no new ventures were

made in the concert room if we except the concerts of Madame Viard Louis. In orchestral concerts the Crystal Palace kept its foremost position. The novelties, or little known works, produced in the Sydenham concert room during the season, included Bach's cantata "God's time is the best," Handel's Chandos Te Deum in B flat, Schumann's overture "Rheinweinlied," Brahms' "Rinaldo," Rubinstein's Concerto for Piano and Orchestra No. 3, a new Magnificat for solo voices and orchestra by Prout, Hatton's "Hezekiah," and Macfarren's "Lady of the Lake," while as a proof of fidelity to the traditions which have made these concerts famous throughout Europe, the nine symphonies of Beethoven were all performed during the season. The Philharmonic Society showed even less enterprise than usual, and more than its common disregard of the works of English composers, and the Sacred Harmonic Society only departed from the traditional cycle of Haydn, Handel, Mendelssohn, and Costa, by introducing Rossini's *Moïse* in oratorio form, as, by the way, it originally left its composer's hand. The Royal Albert Hall Choral Society, with Mr. Barnby at its head, showed far more spirit, and produced Macfarren's new oratorio "Joseph," written for the Leeds Festival of 1877, for the first time in London. The Bach Choir, with Mr. Otto Goldschmidt as its conductor, worked on its way with ample zeal and met with hearty encouragement. Its programmes included a repetition of the B minor Mass, the production of which gave the Society life and a name, and the old cantor's noble Magnificat and his Christmas Oratorio were also heard. Among the more modern works sung by the choir were Purcell's six-part anthem, "O God, Thou hast cast us out," Schumann's New Year's Song, and the "Schicksal-Lied" of Brahms. At the East End of London, Mr. Ebenezer Prout, able and earnest in the threefold capacity of composer, conductor, and critic, did work of almost equal excellence, his concerts at Shoreditch Town Hall being as remarkable for the admirable playing of the orchestra as for the finish of the choral singing. His programmes included a worthy rendering of Beethoven's Mass in D. Of later date the Promenade Concerts given under the auspices of Messrs. A. and S. Gatti, at Covent Garden, with Mr. Arthur Sullivan as chief conductor, deserve mention, because the higher school of music received not only frequent but satisfactory performance, and the season closed with the Ninth Symphony of Beethoven. In the Chamber concerts of the year, the more numerous engagements

of new artists lent attraction to the programmes both of Mr. Chappell's Monday and Saturday Popular Concerts and of the Musical Union, while in the same field Herr Franke gave some excellent performances of modern music, and Mr. Charles Hallé's recitals resolved themselves into programmes on the Monday Popular model. Among the artists who left their mark on the Monday Popular Concerts were Herr Ignaz Brüll and Mdlle. Krebs, the pianists, and Herr Henschel among the vocalists, Joachim, Straus and Piatti, being as usual the prominent members of the quartet party. At the Musical Union Papini and Marsick were the first violins, and the pianists included Mdme. Montigny-Remaury, one of the most conscientious artists ever heard at these admirable concerts, M. de Beriot, and Herr Jaell. The season was signalized by a noteworthy exhibition of friendly regard for the venerable director on the part of the great pianist, Herr von Bülow, who played gratuitously at the sixth concert as a token of his sympathy with Professor Ella's work.

In the Opera House the Italian Companies did little new work. At Her Majesty's Theatre, where Mr. Mapleson held his season from the 20th of April to the 27th of July, with five performances a week, the operas given included Bizet's "Carmen," which met with decided success with Miss Hauk in the chief rôle, but the promises as regarded the new version of "Forza del Destino" and "Mirella," were not fulfilled. Mdlle. Gerster, who redeemed the previous season from flatness after the death of Tietjens, proved a genuine success, and the débuts of Mdlle. Tremelli and Miss Mary Cummings, two new contraltos, were also to be noted. At the Royal Italian Opera, Covent Garden, Bizet's work, promised with Mdme. Adelina Patti, as the heroine, was not given, but Massé's "Paul et Virginie," with Mdme. Albani was produced, and Flotow's "Alma" was also heard. The débutants at this house were far from promising. Far more interesting than the Italian season were Mr. Carl Rosa's performances of opera in English, at the Adelphi Theatre, where he produced Brull's "Golden Cross," which scarcely fulfilled the expectations formed of it from the golden verdicts of the critics at Berlin. Wagner's "Flying Dutchman" was also given with great effect, and Nicolai's "Merry Wives of Windsor" once more proved an attractive line in the bills. A still more successful venture of the year at the Opera Comique, in the Strand, remains to be recorded. This house, under the direction of a limited company, opened in the autumn of 1877, with a comic opera,

"The Sorcerer," the joint work of Messrs. Sullivan and Gilbert, and this in its turn, after a most successful run, was followed by another joint work from the same pens, entitled "H.M.S. Pinafore," which still holds the boards and draws crowded houses. A bright prospect for English comic opera has been opened out by the success of the performances at this house for the operas produced have proved exactly suited to the public taste, and will in time counteract the mischievous works of the French school, which have unfortunately become naturalized in England. Not only have these pieces by the popular composer and librettist been successful in London, but they have met with a similar welcome in the country, where they have been performed by a second company.

In the provinces the festivals at Brighton, Worcester, and Norwich have been the chief events of the year. At Worcester, where in 1875 the festival was unaccompanied by an orchestra, the full band has been restored to its place; and at the recent meeting a cantata, by Dr. Stainer, "The Raising of Jairus's Daughter," and a setting of "Magnificat" and "Nunc Dimittis," by Sir Frederick Ouseley, were heard for the first time, and "Hezekiah," an oratorio by Dr. Armes, which had undergone revision at its composer's hands, was also performed. At Norwich, of absolute novelty there was none, but Dr. Macfarren's "Joseph" formed a prominent feature in the scheme. At Edinburgh the Orchestral Festival, under the auspices of the Revd. Professor Sir Herbert Oakeley, was fashioned on its usual classical model, and the University Musical Society has also worked well under the same guidance. At Glasgow, as at the capital, the effort to provide orchestral concerts of a high order has been thoroughly successful, and the experiment is to be repeated this year.

In closing our brief record, we have happily few losses to note in the ranks of our native musicians; but abroad death has been more busy, and the talented François Bazin, the composer; Carl Wilhelm, the critic and lyric writer; Gayarré, the tenor singer; and Debain, the French harmonium and pianoforte maker, are among those who have passed away. The English obituary includes the name of Mr. Alfred Stone, the Bristol choirmaster, who laboured so zealously to promote the success of the local festivals.

ENGLISH PHILANTHROPY IN 1878.

One of the most satisfactory features which meet us in looking back over the progress of philanthropic effort during the past year is the increased attention devoted to the abuses in the management of our large hospitals which have too long passed unnoticed. It is not too much to say that there has been a gross misuse of the out-patient departments at many of the larger hospitals, and the absence of a proper check upon the ability of the persons presenting themselves to pay for medical aid, coupled with the unworthy meanness of individuals who have literally been robbing their poorer brethren by accepting gratuitous treatment has led to a frequent misapplication not only of money but of the time of the medical officers. The best means of remedying this evil is now being made the subject of careful investigation, and ultimately it is to be hoped that it will be satisfactorily dealt with. It would, however, be a mistake to suppose that all those persons who crowd the hospital rooms on the out-patients' days are simply actuated by the desire to escape the payment of a fee to their local medical attendant, for in many cases their aim is to secure what they not unnaturally regard as the benefit of superior skill and experience, and hence the necessity for establishing partially self-supporting hospitals has suggested itself. For the upper and middle classes the Home Hospitals Association, instituted at a public meeting at the Mansion House, on the 27th of June, 1877, is being actively promoted, the object being to provide homes for the treatment and cure of disease, as in hospitals, by skilled nursing, rest, and regulated diet under proper sanitary and hygienic conditions, for the benefit of all classes who can afford to pay in various degrees for such advantages. The institution is to be self-supporting but the relief of the suffering, and the benefit of the community—not gain—are its objects. A sum of 20,000*l.* is being raised to establish the first of the series of homes, and towards this 12,000*l.* has been received. The office of the Association is, it may be added, at the Mansion House, the birth-place of so many excellent and admirably managed funds. More recently an attempt has been made to carry out the same idea on a somewhat numbler scale, and with a more distinctly local object, by Canon Erskine Clarke, the Vicar of Battersea, whose name has for more than a quarter of a century been identified with practi-

cal schemes for the welfare of the people, from the Penny Bank and Workmen's Club, in which he was one of the pioneer workers, up to the Provident Dispensary, to which he has now added his Provident Hospital. His object is to establish a hospital for small shopkeepers and skilled mechanics who are able to pay for the treatment and subsistence of themselves and their families. The scheme is a direct outgrowth from the Provident Dispensary, a form of institution which is also, we are glad to say, being very widely extended, and the Council of the Charity Organization Fund have recently instituted a special fund called the Metropolitan Provident Dispensary Extension Fund for carrying on this department of their work. Mr. Timothy Holmes, F.R.S., has accepted the chairmanship of the committee, through whose agency it is hoped that in the course of time a large number of those who attend the out-patient departments of the hospitals, but are in position to make a small weekly payment, may be induced to become members of institutions of a self-supporting character. The importance of this work is twofold, for while it will tend to remove the pauperizing influence which is inseparably connected with the receipt of relief on the hospital system when it is used by persons able to provide for themselves, it will prove a still greater boon to those who, while unwilling to become dependents, also shrink from incurring a doctor's bill, and frequently neglect to obtain advice until it is too late to be of use. On all grounds then the application of the co-operative or mutual assurance principle to the provision of medical relief seems to be worthy of extensive adoption, and it is satisfactory to learn that the members of the medical profession are showing every disposition to lend their valuable aid in carrying out such schemes. Like the Cottage Hospital and the County Medical Club, described in the "Companion" for 1877, the idea is to utilize the services of the medical practitioner at a fair rate of remuneration, and thus there ought to be no antagonism from any quarter. As a proof that the heads of the medical profession in the metropolis are ready to give the scheme their active support and countenance, we may instance the case of Sir William Gull, who in an address on this subject has pointed out the value of the dispensary as a local institution, in contrast to the large hospital where there can be no sufficient investigation and no attendance on the case at home. Of the urgent need for the establishment of such institutions in some parts of the metropolis the map of the Medical Charities of

London, recently published by the Editor of the *British Medical Journal*, affords an abundant illustration. The map is divided into squares measuring two miles in each direction, and while one of these districts contains five general and eleven special hospitals, and nine charitable and seven poor law dispensaries, there is not a single provident dispensary within its limits. In another square, including Wapping and South Bermondsey, the only medical charities shown by the map are three poor law dispensaries. The map will be found of much interest and use to philanthropists.

Before leaving this branch of the year's work we may note the results of the Hospital Sunday Collection in the metropolis, which has now been made for the sixth time in the churches and chapels of every religious body, and it may be interesting to give the sums received in each year :—

1873	£27,700	1876	£27,042
1874	29,936	1877	26,600
1875	26,396	1878	24,460

The cost of collecting and distributing the fund continues to be kept at the lowest practicable amount, and the satisfactory character of its management is clearly proved by the fact that the only complaints made against the decisions of the Committee have arisen in cases where their ruling has received the adhesion of the general body of subscribers as represented by the delegates from the various contributing congregations. The expression of a wish that grants should be made to the funds for the supply of surgical instruments and appliances has been met by a suggestion, on the part of the Distribution Committee, that in order to give effect to the intentions of the Council, the sum of one per cent. of the total amount of the collections in future years shall be set aside for the purchase of such appliances. Letters of recommendation will be issued on application to the several contributors to the fund, which letters, as soon as the medical authorities of any hospital or dispensary have certified that the case is a fit one for relief, will enable the patient to obtain the surgical appliance that may be necessary through the agency of one of the hospitals or dispensaries. This course was approved at the annual meeting. The Committee adhere strictly to the rules named for the distribution of the fund, and only in one instance have they departed from it to include the Hospital of St. John and St. Elizabeth on account of the economy of its working, although it has no committee of management as required by

the scheme of distribution. The Hospital for Diseases of the Throat in Golden Square to which the Committee, on Sir Sydney Waterlow's motion, refused a grant in 1877 on the ground that they were not satisfied with its management, is again absent from the list of institutions to which money is voted, a point of which the public ought to take due note, as also of the fact that the Prince and Princess of Wales have withdrawn their patronage and sanction from the hospital. The list of institutions assisted by the Hospital Sunday Fund numbers 125, being an increase of six on the year 1877. An endeavour will, we understand, be made during the present winter to fix some Sunday to be regarded permanently as Hospital Sunday, an arrangement which will have many advantages, as it will enable the clergy to leave the day open for this special object. The Hospital Saturday Fund has again had a collection. Last year the cost of its collection amounted to 18 per cent. of the receipts.

Among the special movements which come within the scope of our review of the year, may be mentioned the appointment of the Royal Commission to inquire into the Parochial Charities of the City of London. The Commissioners, of whom the Duke of Northumberland is the Chairman, include Canon Gregory, Prebendary Rogers, Mr. Herschell, Q.C., Mr. Cubitt, M.P., Mr. Albert Pell, M.P., and Mr. H. Gibbs, with Mr. E. H. Birley as their secretary. The Commission has been appointed in accordance with a pledge given by Mr. Cross to Mr. James, who in May last moved a resolution in the House of Commons to the effect "that it is desirable that Her Majesty's Government should at the earliest possible date introduce some legislative measure carrying into effect the recommendations of the 24th Report of the Charity Commissioners with respect to the Parochial Charities of the City of London." According to Mr. James's statement the number of the charities in question is 112, their total income being about 101,000*l.* a year, while the average population in each parish was 428 in 1861, and 264 in 1871. The readiness with which the Home Secretary acceded to Mr. James's proposal was partly due to the fact that he had himself received memorials from some of the interested parishes in favour of the appointment of the Commission, and as he promised to take the matter in hand Mr. James withdrew his motion. The task which the Commission has before it is of a very difficult and delicate character, for the vested interests in these charities are numerous, and the uses to which the funds have been put are

in some cases notoriously different from those to which the pious founders intended their benefactions to be applied. As regards the constitution of the Commission the general opinion seems to be that it has been fairly chosen.

Among the efforts which are being made to provide for those who are in the truest sense of the words innocent sufferers, the establishment of the "Ladies' Christian Homes for Deaf and Dumb Children" is worthy of all praise. The education of such children has been undertaken by the London School Board, but homes in which they can be boarded and watched over are essential for the completion of this work, and to supply these a special association has been formed under the direction of the Rev. William Stainer. Two homes are already opened and two more are needed, and as the parents of the children contribute according to their means towards their maintenance, the scheme is partly self-supporting and is well worthy of assistance. It is to be hoped that the privilege accorded to the parents of these children by the Act which provides that relief given to them is not to be deemed to be parochial relief may ultimately be extended to idiots and imbeciles, for whom but few institutions exist, and for whose treatment very scanty provision is made. The Charity Organization Society has taken up this matter, and the President of the Local Government Board has promised to give it his attention.

The commercial depression of the year has unquestionably exercised its influence on public almsgiving and but few new institutions have been formed. In two cases, however, in which a special appeal has been recently made to the public liberality, the result has been most creditable. For the sufferers by the loss of the *Princess Alice*, 35,000*l.* has been raised, and for the widows and orphans of the men killed by the Abercarne Explosion, 25,000*l.*, up to the time of writing. The collection of these great national funds has been appropriately undertaken at the Mansion House, and a suggestion has been made by the writer of this paper and by Mr. Orrell Lever, that instead of instituting special collections whenever a calamity occurs, it would be better to form a central fund, under the direction of the Chief Magistrate, with a Committee authorised to disburse from its balance in all cases of distress. This proposal is under consideration, and if it were acted upon during the coming mayoralty it would prove a great boon to the country.

TABLE OF ALL THE PUBLIC GENERAL ACTS

PASSED IN THE FIFTH SESSION OF THE TWENTY-FIRST PARLIAMENT OF GREAT BRITAIN AND IRELAND,

41 AND 42 VICTORIÆ. A.D. 1878.

(The Acts are given in the order in which they were passed, the number denoting the chapter. An Abstract of those Acts distinguished by an asterisk is given in the pages following this table, which contain a classified epitome of the more important statutes passed during the year.)

1. An Act to apply the sum of £6,000,000 out of the Consolidated Fund, to the service of the year ending the 31st of March, 1878.

2. An Act to raise the sum of £6,000,000 by Exchequer Bonds, Exchequer Bills, or Treasury Bills.

(Applies 29 & 30 Vict. c. 25; Exchequer Bills and Bonds Act, 1866.
,, 40 & 41 Vict. c. 2; Treasury Bills Act, 1877.)

*3. An Act to relieve certain Occupiers of Dwelling-Houses from being disqualified from the right of voting in the Election of Members to serve in Parliament by reason of their under-letting such Dwelling-Houses for short terms.

(Amends 30 & 31 Vict. c. 102; Representation of the People Act, 1867.)

*4. An Act to extend the hours of Polling at Parliamentary Elections in the Metropolis.

(Extends Hours of Polling in Metropolitan Boroughs.)

5. An Act to relieve certain Occupiers of Dwelling-Houses in Scotland from being disqualified from the right of voting in the Election of Members to serve in Parliament by reason of their under-letting such Dwelling-Houses for short terms.

(Amends 31 & 32 Vict. c. 48; Representation of the People (Scotland) Act, 1868.)

6. An Act to amend the Glebe Loan (Ireland) Amendment Act, 1875.

(Amends 38 & 39 Vict. c. 30, and extends Time for Loans under 33 & 34 Vict. c. 112, and 34 & 35 Vict. c. 100, to 31st August, 1880.)

7. An Act to raise the sum of £1,000,000 by Exchequer Bonds, for the service of the year ending on the 31st of March, 1878.

(Applies 29 & 30 Vict. c. 25; Exchequer Bills and Bonds Act, 1866.)

8. An Act to enable Local Authorities to acquire and lay out Land for Public Parks and Pleasure Grounds in Scotland.

(Applies 30 & 31 Vict. c. 101; Public Health (Scotland) Act, 1867.
,, 38 & 39 Vict. c. 49; Artizans' Dwellings (Scotland) Act, 1875.
,, 8 & 9 Vict. c. 19, and 23 & 24 Vict. c. 106; Lands Clauses (Scotland) Acts, 1845 and 1860.
,, 28 & 29 Vict. c. 27; Costs (Provisional Orders) Act, 1865.
,, 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.)

9. An Act to apply certain sums out of the Consolidated Fund to the service of the years ending on the 31st day of March, 1877, 1878, and 1879.

10. An Act for punishing Mutiny and Desertion, and for the better payment of the Army and their Quarters.

(Applies 26 & 27 Vict. c. 57; Regimental Debts Act, 1863.
Amends 33 & 34 Vict. c. 67; Army Enlistment Act, 1870.)

11. An Act for the Regulation of Her Majesty's Royal Marine Forces while on shore.

(Repeals part of 10 & 11 Vict. c. 63; Marines Enlistment Act, 1847.)

*12. An Act for the prevention of Accidents by Threshing Machines.

(Provides for the fencing of Steam Threshing Machines.)

*13. An Act to declare the Law relating to the Acceptance of Bills of Exchange.

(Removes doubts arising as to effect of a certain enactment in Mercantile Law Amendment Act, 19 & 20 Vict. c. 97, and Mercantile Law Amendment (Scotland) Act, 19 & 20 Vict. c. 60.)

14. An Act to amend the Law relating to Public Baths and Wash-houses.

(Amends 9 & 10 Vict. 74, and 10 & 11 Vict. c. 61; Baths and Wash-houses Acts, 1846 and 1847.

Construes 38 & 39 Vict. c. 66, Statute Law Revision Act, 1875, and 38 & 39 Vict. c. 55, Public Health Act, 1875, with this Act.

Applies 29 & 30 Vict. c. 31, Metropolis Local Management Act, 1866, as to Superannuation.)

15. An Act to grant certain Duties of Customs and Inland Revenue, to alter other Duties, and to amend the Laws relating to Customs and Inland Revenue.

(Alters Duties, &c., on Tobacco under Customs Act, 1876, 39 & 40 Vict. c. 35, and Manufactured Tobacco Act, 1863, 26 & 27 Vict. c. 7.

Amends 39 & 40 Vict. c. 36; Customs Consolidation Act 1876.

Repeals part of 34 & 35 Vict. c. 103; Customs and Inland Revenue Act, 1871.

Taxes:—

Grants Duties of Income Tax and applies existing Acts; provides also for collection of Income Tax and Inhabited House Duties, and applies 32 & 33 Vict. c. 67, Valuation, Metropolis, Act, 1869.

Amends the Law as to Inhabited Houses, and repeals section 11 of 32 & 33 Vict. c. 14.

Transfers Serjeants' Inn to City of London for purposes of Taxes, and amends 38 Geo. 3, c. 5.

Excise:—

Increases Duty on Dogs imposed by 30 & 31 Vict. c. 5, and repeals section 38 of 32 & 33 Vict. c. 14.

Regulates Warehousing of British Spirits under 28 & 29 Vict. c. 98.

Restricts use of Alkaline Salts in manufacture of Snuff, and explains 5 & 6 Vict. c. 93.

Stamps:—

Interprets 33 & 34 Vict. c. 97, as to Contract Notes.

Repeals Duty on certain Ecclesiastical Licences.)

16. An Act to consolidate and amend the Law relating to Factories and Workshops.

(Repeals (wholly) the following Acts relating to Factories and Workshops:—42 Geo. 3, c. 73, 3 & 4 Will. 4, c. 103, 7 & 8 Vict. c. 15, 9 & 10 Vict. c. 40, 13 & 14 Vict. c. 54, 16 & 17 Vict. c. 104, 19 & 20 Vict. c. 38, 24 & 25 Vict. c. 117, 26 & 27 Vict. c. 40, 27 & 28 Vict. c 48, 30 & 31 Vict. c. 103, 30 & 31 Vict. c. 146, 33 & 34 Vict. c. 62, 34 & 35 Vict. c. 19, 34 & 35 Vict. c. 104, 37 & 38 Vict. c. 44.

Repeals part of section 19 of 29 & 30 Vict. c. 90; Sanitary Act, 1866.

" parts of sections 4 and 91 of 38 & 39 Vict., c. 55; Public Health Act, 1875.

" section 8 and part of section 48 of 39 & 40 Vict. c. 79; Elementary Education Act, 1876.

Applies 8 & 9 Vict. cc. 16, 17; Companies Clauses Acts, 1845.

" 38 & 39 Vict. c. 13; Holidays Extension Act, 1875.

" 33 & 34 Vict. c. 75; Elementary Education Act, 1870.

" 36 & 37 Vict. c. 86; Elementary Education Act, 1873.

" 39 & 40 Vict. c. 79; Elementary Education Act, 1876.

" 29 & 30 Vict. c. 90; Public Health Act, 1866.

" 38 & 39 Vict. c. 55; Public Health Act, 1875.

" 30 & 31 Vict. c. 101; Public Health (Scotland) Act, 1867.

" 37 & 38 Vict. c. 93; Public Health (Ireland) Act, 1874.

" 17 & 18 Vict. c. 80; } Registration of Births, &c., Acts, 1854 and 1863.
" 26 & 27 Vict. c. 11; }

" 11 & 12 Vict. c. 43, and 27 & 28 Vict. c. 53; Summary Jurisdiction and Procedure Acts.

" 20 Geo. 2, c. 43; Appeals.

" 38 & 39 Vict. c. 62; Summary Prosecutions Appeals (Scotland) Act, 1875.

" 14 & 15 Vict. c. 90; Fines (Ireland) Act, 1851.

" 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.)

17. An Act to amend the Adulteration of Seeds Act, 1869.
(Amends 32 & 33 Vict. c. 112; Adulteration of Seeds Act, 1869.)

18. An Act to grant Money for the purpose of Loans by the Public Works Loan Commissioners and by the Commissioners of Public Works in Ireland, and to authorize the former Commissioners to compound and cancel certain Loans and Interest, and to amend the Public Works Loans Act, 1875.
(Amends 38 & 39 Vict. c. 89; Public Works Loans Act, 1875.
Compound Debt due by Epping Sanitary Authority under 29 & 30 Vict. c. 90; Sanitary Act, 1866.
Repeals obligations of Public Works Loan Commissioners to take securities under Local Loans Act, 38 & 39 Vict. c. 83.
Applies 40 & 41 Vict. c. 27; Public Works Loans (Ireland) Act, 1877.)

*19. An Act to amend the Matrimonial Causes Acts.
(Amends 22 & 23 Vict. c. 61; Matrimonial Causes Act, 1859.
Empowers Court to order that wife be not bound to cohabit if husband convicted of an aggravated assault under 24 & 25 Vict. c. 100, s. 43.)

*20. An Act to provide for returns respecting Continuous Brakes in use on Passenger Trains on Railways.
(Applies 34 & 35 Vict. c. 78; Regulation of Railways Act, 1871.)

21. An Act to apply the sum of £7,500,000 out of the Consolidated Fund, to the service of the year ending on the 31st of March, 1879.

22. An Act to raise the sum of £1,500,000 by Exchequer Bonds, for the service of the year ending on the 31st of March, 1879.
(Applies 29 & 30 Vict. c. 25; Exchequer Bills and Bonds Act, 1866.)

23. An Act to remove doubts concerning the due Acknowledgment of Deeds by Married Women in Ireland in certain cases.
(Recites 4 & 5 Will. 4, c. 92; Fines and Recoveries (Ireland).
" 40 & 41 Vict. c. 56; Country Officers and Courts (Ireland) Act, 1877.)

24. An Act to amend the Public Works Loans (Ireland) Act, 1877, so far as relates to Lunatic Asylums.
(Amends 40 & 41 Vict. c. 27, so far as relates to Lunatic Asylums.)

*25. An Act to amend the Public Health Act, 1875, so far as relates to the supply of Water.
(Amends 38 & 39 Vict., c. 55 (Public Health Act, 1875), and construes Act therewith.)

*26. An Act to amend the Law relating to the Registration of Voters in Parliamentary Boroughs and the Enrolment of Burgesses in Municipal Boroughs, and relating to certain rights of voting and proceedings before and appeals from Revising Barristers.
(Amends 2 & 3 Will. 4. c. 45; Reform Act, 1832.
" 30 & 31 Vict. c. 102; Representation of the People Act, 1867.
" 5 & 6 Will. 4. c. 76: Municipal Corporations Act, 1835.
" 6 & 7 Vict., c. 18; Parliamentary Registration Act, 1843.
" 32 & 33 Vict. c. 41, s. 19: Poor Rates Assessment, &c., Act, 1869.
Applies 36 & 39 Vict., c. 40; Municipal Elections Acts, 1875.
" section 28 of 37 & 38 Vict. c. 88; Births and Deaths Registration Act, 1874.
" sections 7 & 8 of 28 & 29 Vict. c. 36; County Voters' Registration Act, 1865.
" section of 22 Vict. c. 35; Municipal Corporations Act, 1859.
" section 13 of 35 & 36 Vict. c. 33; Ballot Act, 1870.)

27. An Act to amend the Supreme Court of Judicature Act (Ireland), 1877.
(Amends 40 & 41 Vict. c. 57; as to Constitution of Commissions of Assize.)

28. An Act to further amend the Law of Entail in Scotland.
(Amends 38 & 39 Vict. c. 61; Entail Amendment (Scotland) Act, 1875.)

*29. An Act for conferring powers upon the Metropolitan Board of Works with respect to the Obelisk known as Cleopatra's Needle, and other monuments.
(Applies 18 & 19 Vict. c. 120, in respect to recovery of penalties for Injury to the Obelisk known as Cleopatra's Needle, &c.)

30. An Act to alter the time of electing Commissioners under the General Police and Improvement (Scotland) Act, 1862.
(Repeals sections 50 and 51 of 25 & 26 Vict. c. 101; General Police and Improvement (Scotland) Act, 1862.)

*31. An Act to consolidate and amend the Law for preventing Frauds upon Creditors by secret Bills of Sale of Personal Chattels.
(Repeals 17 & 18 Vict., c. 36; Bills of Sale Act, 1854.
,, 29 & 30 Vict., c. 96; Bills of Sale Act, 1866.
Applies 36 & 37 Vict. c. 66, and 38 & 39 Vict. c. 77; Supreme Court of Judicature Acts, 1873 and 1875.)

*32. An Act to amend the Metropolis Management Act, 1855, the Metropolitan Building Act, 1855, and the Acts amending the same respectively.
(Amends 18 & 19 Vict. c. 120; Metropolis Management Act, 1855, and Acts amending the same.
,, 18 & 19 Vict. c. 122; Metropolitan Building Act, 1855, and Acts amending the same.
Saves 57 Geo. 3. c. 29, Metropolis Paving, &c.)

33. An Act to amend the Law relating to Dental Practitioners.
(Applies 21 & 22 Vict. c. 90; Medical Act, 1858.
,, 5 & 6 Will. 4, c. 62; Oaths and Affirmations Act, 1835.
,, 11 & 12 Vict. c. 43; Summary Jurisdiction Act, 1848.
,, 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.
,, 27 & 28 Vict. c. 53; Summary Procedure (Scotland) Act, 1864.)

34. An Act to amend the Law relating to Highways in South Wales.
(Amends 23 & 24 Vict. c. 68; South Wales Highways Act, 1860.
Applies 10 & 11 Vict. c. 16; Commissioners Clauses Act, 1847.
,, 8 & 9 Vict. c. 18; Lands Clauses Act, 1845.)

35. An Act to extend for a further limited period section 34 of the Supreme Court of Judicature Act, 1875.
(Continues (until 1st January, 1880) section 34 of 38 & 39 Vict. c. 77; Supreme Court of Judicature Act, 1875.)

36. An Act to continue for one year the Police (Expenses) Act, 1875.
(Continues (until 1st September, 1879) 38 & 39 Vict. c. 48, Police (Expenses) Act, 1875.)

37. An Act to further amend the Acts relating to the raising of Money by the Metropolitan Board of Works; and for other purposes relating thereto.
(Amends and applies Acts, 1869 to 1877; viz., 32 & 33 Vict. c. 102, 33 & 34 Vict. c. 24, 34 & 35 Vict. c. 47, 38 & 39 Vict. c. 65, 39 & 40 Vict. c. 55, and 40 & 41 Vict. c. 52.
Applies 18 & 19 Vict., c. 120, and 25 & 26 Vict. c. 102, Metropolis Management Acts, 1855 and 1862.
Applies 28 & 29 Vict. c. 90; Fire Brigade Act, 1865.
,, 35 & 36 Vict. c. 163, and ,, 40 & 41 Vict. c. 235 } Metropolitan Street Improvements Acts, 1872 and 1877.
,, 36 & 37 Vict. c. 86; Metropolitan Commons Act, 1873 (Tooting Beck Common).
,, 38 & 39 Vict. c. 179; Metropolitan Board of Works Act, 1875 (Tooting Graveney Common).
,, 41 & 42 Vict. c. 145; Metropolitan Board of Works Act, 1878 (Plumstead Common).
,, 24 & 25 Vict. c. 98; as to Forgery.)

*38. An Act for the further relief of Innkeepers.
(Empowers Landlords, &c., to dispose of Goods left with him after six weeks.)

39. An Act for the Protection of Freshwater Fish.
(Amends and extends 24 & 25 Vict. c. 109; ,, 28 & 29 Vict. c. 121; ,, 36 & 37 Vict. c. 71; ,, 39 & 40 Vict. c. 19; } Salmon Fishery Acts, 1861 to 1876.
,, 40 & 41 Vict. c. 65; Fisheries (Dynamite) Act, 1877.)

40. An Act to remove doubts with respect to the application to Scotland of the Prisons Authorities Act, 1874.

(Removes doubts as to application to Scotland of 37 & 38 Vict. c. 47; Prisons Authorities Act, 1874.)

41. An Act to enable Returning Officers at Parliamentary Elections in Scotland to require Security for their Expenses; and otherwise to amend the Law of Scotland relating to such Expenses.

(Amends 35 & 36 Vict. c. 33; Ballot Act, 1872.)

42. An Act to amend and further extend the Acts for the Commutation of Tithes in England and Wales.

(Amends 6 & 7 Will. 4, c. 71, 7 Will. 4, and 1 Vict. c. 69, 1 & 2 Vict. c. 64, 2 & 3 Vict. c. 62, 3 & 4 Vict. c. 15, 5 & 6 Vict. c. 54, 9 & 10 Vict. c. 73, and 23 & 24 Vict. c. 93.)

43. An Act to encourage Regular Marriages in Scotland.

(Amends 17 & 18 Vict. c. 80; Registration of Births, &c. (Scotland). Applies 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.)

*44. An Act to make provision for the foundation of a Dean and Chapter for the Bishopric of Truro, and for the transfer to the Cathedral Church of Truro of the Canonries in the Cathedral Church of Exeter; and for other purposes connected therewith.

(Amends 39 & 40 Vict. c. 54; Bishopric of Truro Act, 1876. Transfers Canonry from Cathedral Church of Exeter to Cathedral Church of Truro.)

45. An Act to apply the sum of £14,500,000 out of the Consolidated Fund to the service of the year ending on the 31st of March, 1879.

46. An Act to enable Her Majesty to provide for the Establishment of His Royal Highness the Duke of Connaught and of Strathearn and Her Royal Highness Princess Louise Margaret Alexandra Victoria Agnes of Prussia, and to settle an Annuity on Her Royal Highness.

47. An Act to enable the Trustees of the Elders Widows' Fund to apply the Capital of the said Fund in aid of Income; and for other purposes in relation thereto.

(Empowers Trustees of the Elders Widows' Fund of late East India Company to transfer to the India Office Provident Fund the sum of £3,317 6*s.* 8*d.*, with interest, &c.)

48. An Act to amend the Law relating to Endowed Schools and Hospitals and other Endowed Institutions in Scotland; and for other purposes.

(Amends Law relating to Endowed Schools and Hospitals, &c., in Scotland.)

49. An Act to consolidate the Law relating to Weights and Measures.

(Repeals the following Acts, and parts of Acts, subject to certain specified Re-enactments:—
31 Edw. 3 s. 1, c. 2 of the Statute of Westminster; 6 Anne c. 11 (5 & 6 Anne, c. 8 in Ruffhead) Article 17 of Act of Union; 15 Geo. 2, c. 20, s. 5; 35 Geo. 3, c. 102; 36 Geo. 3, c. 85, s. 1 in part; 37 Geo. 3, c. 143; 55 Geo. 3. c. 43; 5 Geo. 4, c. 74 (except section 25); 6 Geo. 4, c. 12; 5 & 6 Will. 4, c. 63; 16 & 17 Vict. c. 29; 16 & 17 Vict. c. 79, s. 5; 18 & 19 Vict. c. 72; 22 & 23 Vict. c. 56; 23 & 24 Vict. c. 119; 24 & 25 Vict. c. 75, s. 6; 25 & 26 Vict. c. 76 in part; 25 & 26 Vict. c. 102, s. 101; 27 & 28 Vict. c. 117; 29 & 30 Vict. c. 82; 30 & 31 Vict. c. 94; 33 & 34 Vict. c. 10, s. 17 in part.
Applies 11 & 12 Vict. c. 43, Summary Jurisdiction Act, 1848.
" 27 & 28 Vict. c. 53, Summary Procedure Act, 1864.
" 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.)

50. An Act to amend the County of Hertford and Liberty of St. Alban Act, 1874.

(Partly repeals 37 & 38 Vict. c. 45; County of Hertford and Liberty of St. Alban Act, 1874.)

51. An Act to alter and amend the Law in regard to the Maintenance and Management of Roads and Bridges in Scotland.

(Repeals 8 & 9 Vict. c. 41; } Except as to certain specified Re-enactments.)
" 1 & 2 Will. 4, c. 43; }

Repeals in part 25 & 26 Vict. c. 53; Edinburgh Roads and Streets Act, 1862.
Amends 26 & 27 Vict. c. 214; Elgin and Nairn Roads, &c. Act, 1863.
,, 37 & 38 Vict. c. 147; Forfarshire Roads Act, 1874.
Applies 25 & 26 Vict. c. 101; General Police and Improvement (Scotland) Act, 1862.
,, 25 & 26 Vict. c. 105; Highland Roads and Bridges Act, 1862.
,, 17 & 18 Vict. c. 91; Valuation (Scotland) Act, 1854.
,, 28 & 29 Vict. c. 27; Costs (Provisional Orders) Acts, 1865.
,, 8 & 9 Vict. c. 33; Railways Clauses Act, 1845.
,, 8 & 9 Vict., c. 19; Lands Clauses Act, 1845.
,, 31 & 32 Vict. c. 84; Entail (Scotland) Act, 1868.
,, 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.
,, 38 & 39 Vict. c. 62; Summary Prosecution Appeals (Scotland) Act. 1875.)

52. An Act to consolidate and amend the Acts relating to Public Health in Ireland.

Repeals the following enactments, viz.:—
*14 & 15 Vict. c. 28;
*16 & 17 Vict. c. 41;
23 & 24 Vict. c. 26; } Common Lodging Houses Acts, 1851, 1853, 1860.
17 & 18 Vict. c. 103 (in part); Towns Improvement (Ireland) Act, 1854.
18 & 19 Vict. c. 116; Diseases Prevention Act, 1855.
*18 & 19 Vict. c. 121;
*23 & 24 Vict. c. 77;
*26 & 27 Vict. c. 117;
*29 & 30 Vict. c. 41; } Nuisances Removal Acts, 1855, 1860, 1863, and 1865.
19 & 20 Vict. c. 98;
23 & 24 Vict. c. 76; } Burial Grounds (Ireland) Acts, 1856 and 1860.
*28 & 29 Vict. c. 75;
*30 & 31 Vict. c. 113; } Sewage Utilization Acts, 1865 and 1867.
*29 & 30 Vict. c. 90;
*31 & 32 Vict. 115;
36 & 37 Vict. c. 78; } Sanitary Acts, 1866, 1868, and 1873;
*32 & 33 Vict. c. 100; Sanitary Loans Act, 1869.
34 & 45 Vict. c. 109 (in part);
35 & 36 Vict. c. 69 (in part); } Local Government (Ireland) Acts, 1871 and 1872.
37 & 38 Vict. c. 93; Public Health (Ireland) Act, 1874.
Applies 3 & 4 Vict. c. 108; Municipal Corporations Act, 1840.
,, 29 & 30 Vict., c. 44;
,, 30 & 31 Vict. c. 28; } Labouring Classes Dwellings (Ireland) Acts, 1866 and 1867.
,, 31 & 32 Vict. c. 130; Artizans and Labourers Dwellings Act, 1868.
,, 26 & 27 Vict. c. 40; Bakehouse Regulation Act, 1863.
,, 18 & 19 Vict. c. 116
,, 23 & 24 Vict. c. 77; } Diseases Prevention Acts, 1855 and 1860.
,, 29 & 30 Vict. c. 90, Sanitary Act, 1866.
,, 9 & 10 Vict. c. 87; Baths and Wash-houses Act, 1846.
,, Lands Clauses Acts, 1845 and 1860.
,, Railways Clauses Acts, &c., 1851, 1860, and 1864.
,, Waterworks Clauses Acts, 1863 and 1847.
,, Companies Act, 1862.
,, Gas and Water Works Facilities Act, 1870.
,, Markets and Fairs Clauses Act, 1847.
,, Towns Improvement Clauses Act, 1847.
,, Cemeteries Clauses Act, 1847.
,, Poor Law Acts, I & 2 Vict. c. 56, &c.
,, Summary Jurisdiction and Petty Sessions (Ireland) Acts, &c.)

53. An Act to facilitate improvements in the Organisation of the Admiralty and War Office by the retirement of Clerks from certain of the Civil Departments thereof.

(Empowers Treasury to award gratuities to retiring Clerks in the Admiralty and War Office, in addition to ordinary superannuation under 22 Vict. c. 26.
Applies National Debt Acts, 24 & 25 Vict. c. 14, and 26 & 27 Vict. c. 87.)

54. An Act to amend the Debtors Act, 1869, and the Debtors Act (Ireland), 1872.

(Amends 32 & 33 Vict. c. 62; Debtors Act, 1869.
,, 35 & 36 Vict., c. 57; Debtors (Ireland) Act, 1872.)

* The Acts thus indicated are repealed so far as relates to Ireland.

55. An Act to enable the Trustees of the British Museum to remove portions of their Collections.

(Amends 26 Geo. 2, c. 22; Establishing the British Museum and authorizes removal of certain collections to South Kensington.)

56. An Act to amend the Law respecting the expense of regulating Commons.

(Applies Inclosure Acts, 1845 to 1876.
Amends 39 & 40 Vict. c. 56: Commons Act, 1876.)

57. An Act for the Revision of the Statute Law of Ireland.

(Repeals (with savings) the enactments described in the Schedule.)

58. An Act for further regulating the use of Locomotives on Highways in Scotland.

(Amends 24 & 25 Vict. c. 70; } Locomotives Acts, 1861 and 1865, so far as relates
,, 28 & 29 Vict. c. 83; } to Scotland.
Applies 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.
,, 38 & 39 Vict. c. 62; Summary Prosecution Appeals (Scotland) Act, 1875.)

59. An Act to amend the Law relating to the Drainage and Improvement of Land in Ireland.

(Amends 26 & 27 Vict. c. 88; Drainage and Improvement of Lands (Ireland) Act, 1863.)

60. An Act to make better provision for Idiots, Imbeciles, and other afflicted persons in Ireland.

(Empowers Guardians of the Poor to provide for reception of certain Paupers in suitable Institutions.)

61. An Act to remove doubts as to the validity of certain marriages solemnized in the Islands of Fiji prior to their erection into a British Colony.

(Removes doubt as to validity of certain Marriages, solemnized prior to 10th October, 1874.)

62. An Act to continue certain Turnpike Acts, and to repeal certain other Turnpike Acts; and for other purposes connected therewith.

(Repeals and continues certain Local Acts as set forth in the Schedule.)

63. An Act to amend the Prison Acts of 1877, so far as regards the Apportionment of certain Superannuation Allowances between the Treasury and the Local Authorities.

(Amends the Prison Acts of 1877 (40 & 41 Vict. cc. 21, 49, and 53).)

64. An Act to raise the sum of £2,000,000 by Exchequer Bonds, Exchequer Bills, or Treasury Bills, for the service of the year ending on the 31st of March, 1879.

(Applies 29 & 30 Vict. c. 25; Exchequer Bonds and Bills, 1866.)

65. An Act to apply a sum out of the Consolidated Fund to the service of the year ending the 31st of March, 1879, and to appropriate the Supplies granted in this Session of Parliament.

(Authorises issue out of Consolidated Fund of £21,556,807 7*s.* 5*d.*, and appropriation of same.)

66. An Act to promote Intermediate Education in Ireland.

(Establishes "The Intermediate Education Board for Ireland.
Authorises Commissioners under the The Irish Church Act, 1869 (32 & 33 Vict. c. 42), to provide not exceeding £1,000,000 for purposes of Act.)

67. An Act for extending and amending the Foreign Jurisdiction Acts.

(Construes Act with Foreign Jurisdiction Acts, 6 & 7 Vict. c. 94, 28 & 29 Vict. c. 116, 29 & 30 Vict. c. 87, and 38 & 39 Vict. c. 85.
Repeals 6 & 7 Vict. c. 80; China.
,, section 7 of 6 & 7 Vict c. 94; Foreign Jurisdiction Act, 1843.
Applies 28 & 29 Vict. c. 63; Colonial Laws Validity Act, 1865.
,, enactments set out in First Schedule.)

*68. An Act to provide for the foundation of four new Bishoprics in England.

(Applies Queen Anne's Bounty Acts, 2 & 3 Anne, c. 11 and 43, Geo. 3, c. 107.
Amends 38 & 39 Vict. c. 34; Bishopric of St. Alban's Act, 1875.)

69. An Act to amend the Law regulating the Office of Clerk of Petty Sessions, and the Law relating to Fines, in Ireland; and for other purposes.

(Amends 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.
,, 21 & 22 Vict. c. 100; Petty Sessions Clerk (Ireland) Act, 1858.
Applies 14 & 15 Vict. c. 90; Fines (Ireland) Act, 1851.
,, 34 & 35 Vict. c. 65; Juries (Ireland) Act, 1871.
,, 40 & 41 Vict. c. 56; County Officers, &c. (Ireland), Act, 1877.
,, 22 Vict. c. 26; Superannuation Act, 1859.)

70. An Act to continue various expiring Laws.

(Continues (as in Schedule) the following Acts, and Acts amending the same, viz.:—
5 & 6 Will. 4, c. 27; Linen, &c., Manufactures (Ireland).
3 & 4 Vict. c. 89; Poor Rates (Stock in Trade Exemption).
4 & 5 Vict. c. 35; Copyhold, &c., Commissions.
4 & 5 Vict. c. 59; Application of Highway Rates.
10 & 11 Vict. c. 32; Landed Property Improvement (Ireland).
10 & 11 Vict. c. 98; Ecclesiastical Jurisdiction.
11 & 12 Vict. c. 32; County Cess (Ireland).
14 & 15 Vict. c. 104; Episcopal, &c., Estates.
17 & 18 Vict. c. 102; Corrupt Practices Prevention.
23 & 24 Vict. c. 19; Dwellings for Labouring Classes (Ireland).
24 & 25 Vict. c. 109; Salmon Fishery (England).
25 & 26 Vict. c. 97; Salmon Fisheries (Scotland).
26 & 27 Vict. c. 105; Promissory Notes.
27 & 28 Vict. c. 9; Malt for Animals.
27 & 28 Vict. c. 20; Promissory Notes, &c. (Ireland).
28 & 29 Vict. c. 46; Militia Ballots Suspension.
28 & 29 Vict. c. 66; Malt Duty.
28 & 29 Vict. c. 83; Locomotives on Roads.
29 & 30 Vict. c. 52; Prosecution Expenses.
31 & 32 Vict. c. 125; Election Petitions, &c.
32 & 33 Vict. c. 21; Election Commissioners' Expenses.
34 & 35 Vict. c. 87; Sunday Observance Prosecutions.
34 & 35 Vict. c. 105; Petroleum.
36 & 37 Vict. c. 48; Railway Commissioners.)

71. An Act to extend to Metropolitan Commons certain provisions of the Commons Act, 1876.

(Extends certain provisions of the Commons Act, 39 & 40 Vict., c. 56, to Metropolitan Commons under 29 & 30 Vict. c. 122 and 32 & 33 Vict. c. 107.
Empowers Metropolitan Board to acquire common rights under 18 & 19 Vict. c. 120.)

72. An Act to prohibit the Sale of Intoxicating Liquors on Sunday in Ireland.

(Extends Acts prohibiting sale of intoxicating liquors to the whole of Sunday, with certain exceptions.)

73. An Act to regulate the Law relating to the Trial of Offences committed on the Sea within a certain distance of the Coasts of Her Majesty's Dominions.

(Amends the law as to jurisdiction of the Admiral.)

74. An Act for making better provision respecting Contagious and Infectious Diseases of Cattle and other Animals; and for other purposes.

(Repeals (with savings) the following enactments relating to Contagious Diseases (Animals), viz.:—
England and Scotland;—32 & 33 Vict. c. 70 in part, 38 & 39 Vict. c. 75.
Ireland:—11 & 12 Vict. c. 105, 11 & 12 Vict. c. 107, 16 & 17 Vict. c. 62, 29 & 30 Vict. c. 4, 33 & 34 Vict. c. 36, 35 & 36 Vict. c. 16, 37 & 38 Vict. c. 6, 39 & 40 Vict. c. 51.
Applies Act to the Destructive Insects Act, 1877 (40 & 41 Vict. c. 68), instead of 32 & 33 Vict. c. 70, hereby repealed in part.
Applies 39 & 40 Vict. c. 36; Customs Consolidation Act, 1876.
,, 18 & 19 Vict. c. 120; Metropolis Management Act, 1855.
,, 5 & 6 Will. 4, c. 76; Municipal Corporations Act, 1835.
,, 10 & 11 Vict. c. 14; Markets and Fairs Clauses Act, 1867.

Applies 38 & 39 Vict. c. 55; Public Health Act, 1875.
" 41 & 42 Vict. c. 52; Public Health (Ireland) Act, 1878.
" 30 & 31 Vict. c. 101; Public Health (Scotland) Act, 1867.
" 38 & 39 Vict c. 83; Local Loans Act, 1875.
" 38 & 39 Vict. c. 58; Public Works Loans Act, 1875.
" 39 & 40 Vict. c. 80, s. 34; Merchant Shipping Act, 1876.
" 20 & 21 Vict. c. 72; Police (Scotland) Act, 1857.
" 10 & 11 Vict. c. 16; Commissioners Clauses Act, 1847.
" 11 & 12 Vict. c. 43; Summary Jurisdiction Act, 1848.
" 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.
" 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.)

75. An Act to amend the Law in respect to the Polling District of Arranmore (Ireland).

(Provides for the annexation of the polling district of Arranmore to that of Dungloe.)

76. An Act to make further provision respecting the Post Office Telegraphs.

(Amends 26 & 27 Vict. c. 112; Telegraph Act, 1863.
Applies Telegraph Acts, 1863 to 1870.
" 31 & 32 Vict. c. 119; Regulation of Railways Act, 1868.
" 11 & 12 Vict. c. 43; Summary Jurisdiction Act, 1848.
" 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.
" 14 & 15 Vict. c. 93; Petty Sessions (Ireland) Act, 1851.)

77. An Act to amend the Law relating to Highways in England and the Acts relating to Locomotives on Roads; and for other purposes.

(Amends 24 & 25 Vict. c. 70; } Locomotives Acts, 1861 and 1865.
" 28 & 29 Vict. c. 83; }
Repeals section 44 of 5 & 6 Will. 4, c. 50; Highway Act, 1835.
" part of section 7 of 25 & 26 Vict. c. 61; Highway Act, 1862.
" section 36 of 27 & 28 Vict. c. 101; Highway Act, 1864.
Applies 38 & 39 Vic. c. 55; Public Health Act, 1875.
" 43 Geo. 3, c. 59; County Bridges.
" 11 & 12 Vict. c. 43; Summary Jurisdiction Act, 1848.
" Highway Acts, 1835, 1862, and 1864.
" Metropolis Management Act, 1855.)

78. An Act to further amend the provisions of the Law of Scotland on the subject of Education, and for other purposes connected therewith.

(Amends 35 & 36 Vict. c. 62; Education (Scotland) Act, 1872.
Applies 27 & 28 Vict. c. 53; Summary Procedure Act, 1864.
" 8 & 9 Vict. c. 19; Lands Clauses (Scotland) Act, 1845.)

79. An Act for further promoting the Revision of the Statute Law by repealing certain Enactments which have ceased to be in force or have become unnecessary.

(Repeals (with savings) the enactments described in the First Schedule.
Revives enactments in Second Schedule (repealed by Statute Law Revision Acts, 1873 and 1875), viz.:—9 Geo. 4, c. 58, in part; 10 Geo. 4, c. 44, in part; 8 & 9 Vict. c. 100, in part; 9 & 10 Vict. c. 115, in part; 16 & 17 Vict. c. 67, in part, Amends Statute Law Revision Act, 1875, as to partial repeal of 29 & 30 Vict. c. 118.)

ABSTRACTS OF IMPORTANT ACTS

PASSED IN THE FIFTH SESSION OF THE TWENTY-FIRST PARLIAMENT OF GREAT BRITAIN AND IRELAND.

1. CHURCH AND EDUCATION.

ADDITIONAL BISHOPRICS.

[41 and 42 Victoriæ, cap. 68.—16th August, 1878.]

An Act to provide for the foundation of four new Bishoprics in England.

Section I gives the short title of the statute as "The Bishoprics Act, 1878." Section 2 empowers the Ecclesiastical Commissioners for England to receive contributions for the endowment of the bishopries mentioned in the schedule, and section 3 provides for the transfer to such fund of a part of the endowment of existing bishopries connected with the new dioceses. Section 4 sanctions the establishment of the new bishopries by Order in Council when the Ecclesiastical Commissioners certify that the endowment fund will, with the aid from the contributory bishopries, not ultimately be less than 3,500*l.* a year. Under section 5 the number of bishops sitting and voting in Parliament is not to be increased by the foundation of the four additional bishopries, whose occupants are only to take a seat in the House of Lords in rotation when there is a vacancy in a see other than Canterbury, York, London, Durham, or Winchester. When a vacancy is caused by the avoidance of any see other than one of the five sees aforesaid, such vacancy is to be supplied by the issue of a writ of summons to that bishop of a see in England who having been longest bishop of a see in England has not previously become entitled to such writ: Provided, that where a bishop is translated from one see to another, and was at the date of his translation actually sitting as a Lord of Parliament, he shall not thereupon lose his right to receive a writ of summons to Parliament. By section 6 the appointment of the bishop of each of the new dioceses is, until the dean and chapter of such diocese is founded, to be by letters patent, which are to have the same effect as letters patent of Her Majesty nominating a bishop in the case of a bishopric where a dean and chapter have not proceeded to elect a bishop in accordance with the licence and letters missive of Her Majesty, but from and after the foundation of such dean and chapter a vacancy in the bishopric is to be filled in the same manner as a vacancy in any other bishopric in England founded in the reign of any of Her Majesty's predecessors. Section 7 authorises the Ecclesiastical Commissioners on the completion of the endowment fund of any of the four bishopries to lay before Her Majesty schemes which are to be approved by Order in Council as to courts, offices of arch-deaconries, and other incidental arrangements for constituting the new bishopric. By section 8 the funds for the endowment of the new bishopries are to be held in trust by the Ecclesiastical Commissioners and are to be deemed to be for all purposes subject to the same laws as the temporalities and

endowment of any other bishopric in England. Section 9 makes it lawful for Her Majesty by Order in Council to confirm a scheme laid before Her Majesty in pursuance of this Act, and a scheme made in pursuance of this Act is to be of no effect until it has been so confirmed. Orders in Council made in pursuance of this Act are to have effect as if they were enacted in this Act, and are to be published in the *London Gazette*, and shall as soon as practicable after the making thereof be laid before both Houses of Parliament. Sections 10 to 14 supply a series of miscellaneous and saving clauses. The schedule contains the proposals for the new bishoprics: I. Bishopric of Liverpool; (*a*) The bishop to be Bishop of Liverpool; (*b*) The diocese to consist of the West Derby hundred of the county of Lancaster, with the exception of so much of the said hundred as is now in the diocese of Manchester, and to include the whole of the ancient parish of Wigan; (*c*) Such church of Liverpool as may be determined by the Order of Her Majesty in Council, subject to the rights of the patron and incumbent of such church, to be the cathedral church; (*d*) the the Bishopric of Chester to contribute a sum producing 300*l.* a year to the new see. II. The Bishopric of Newcastle; (*a*) The bishop to be Bishop of Newcastle; (*b*) The diocese to consist of the county of Northumberland, and the counties of the towns of Newcastle-upon-Tyne and Berwick-upon-Tweed, and to include such detached parts of any other county as are under any Act of Parliament deemed to form part of the county of Northumberland, or have been or can be transferred to the county of Northumberland by the justices in general or quarter sessions assembled, and to include also the ancient common law parish of Alston with its chapelries in the county of Cumberland; (*c*) The parish church of Saint Nicholas at Newcastle-upon-Tyne, subject to the rights of the patron and incumbent of such church, to be the cathedral church; (*d*) The Bishopric of Durham to contribute a sum to yield 1,000*l.* a year to the new bishopric, subject to certain conditions. III. Bishopric of Southwell; (*a*) The bishop to be Bishop of Southwell; (*b*) The diocese to consist of the counties of Derby and Nottingham; (*c*) the parish and collegiate church of Southwell, subject to the rights of the patron and incumbent of such church, to be the cathedral church; (*d*) The bishopric of Lincoln to contribute a sum yielding 500*l.* a year, and Lichfield 300*l.* a year to the new bishopric under certain conditions. IV. Bishopric of Wakefield; (*a*) The bishop to be Bishop of Wakefield; (*b*) The diocese to consist of that part of the diocese of the Bishopric of Ripon which lies southward of the northern boundaries of the ancient common law parishes of Halifax, Birstal, Batley, West Ardsley, East Ardsley, and Wakefield, or of so much of that part as may be determined by the Order of Her Majesty in Council; and for the purpose of re-arranging the boundary between such diocese and the diocese of the Archbishopric of York, the Order of Her Majesty in Council (on the recommendation of the Ecclesiastical Commissioners, made, unless the see happens to be vacant, with the assent of the archbishop) may include in the diocese of the new bishopric any ecclesiastical parish or parishes situate in the diocese of York, and may transfer to the diocese of York any ecclesiastical parish or parishes situate in the above-mentioned part of the diocese of the Bishopric of Ripon; (*c*) Such church at Wakefield as may be determined by the Order of Her Majesty in

Council, subject to the rights of the patron and incumbent to be the cathedral church; (*d*) The Bishopric of Ripon to contribute a sum yielding 300*l.* a year to the new bishopric.

TRURO CATHEDRAL CHAPTER.

[41 and 42 Victoriæ, cap. 44.—6th August, 1878.]

An Act to make provision for the foundation of a Dean and Chapter for the Bishopric of Truro, and for the transfer to the Cathedral Church of Truro of one of the Canonries in the Cathedral Church of Exeter; and for other purposes connected therewith.

This Act, forming a supplement to "The Bishopric of Truro Act, 1876" (39 and 40 Vict., cap. 54), provides for the transfer to the Cathedral Church of Truro, for the endowment of its chapter, of one of the canonries in Exeter Cathedral. Section 2 enacts that when a canonry at Exeter, other than that held by the Archdeacon of Exeter, first becomes vacant after the passing of this Act then at the expiration of twelve months after the quarter day next following the vacancy, such canonry is to be annexed to the archdeaconry of Exeter, and the canonry at that date held by the Archdeacon of Exeter is to be suspended, and the endowment, with the exception of the house, transferred to the Dean and Chapter of the Cathedral Church of Truro if founded, and if not to the Truro Chapter Endowment Fund. Sections 3 to 5 provide for the founding of the Truro Chapter when the Ecclesiastical Commissioners certify that the fund is sufficient to supply an income for a dean of 1,000*l.*, and for a canon of 300*l.*, exclusive of residence. The Dean and Chapter of Truro, and the endowment thereof, are to be deemed for all purposes to be subject to the same laws as the dean and chapter of any other bishopric in England, and the endowment thereof; and the deanery is to be in the direct patronage of Her Majesty, and every canonry is to be in the patronage of the Bishop of Truro for the time being. By section 6 canonries may be founded before the foundation of a dean and chapter when the Commissioners certify that the Truro Chapter Endowment Fund will provide such minimum income as is mentioned in this Act. By section 10 it is provided that on the first vacancy in the Archdeaconry of Cornwall after the passing of this Act, the amount payable to the archdeacon out of the income of the canonry in the Cathedral Church of Exeter, which is by this Act directed to be transferred to the Cathedral Church of Truro, shall not exceed 200*l.* a year, and the residue of the one-third of the said income which is now paid to the Archdeacon of Cornwall is to be transferred to the Dean and Chapter of Truro, if then founded, and if not, to the Truro Chapter Endowment Fund.

2. LAW AND JUSTICE.

EXTENSION OF POLLING HOURS IN THE METROPOLITAN BOROUGHS.

[41 and 42 Victoriæ, cap. 4.—25th February, 1878.]

An Act to extend the Hours of Polling at Parliamentary Elections in the Metropolis.

Section 1 provides that after the passing of the Act, at every election to return a member or members to serve in Parliament for any of the boroughs named in the Schedule to this Act, London, Westminster, Chelsea, Finsbury, Greenwich, Hackney, Lambeth, Marylebone, Southwark, Tower Hamlets, the poll, if taken, shall commence at 8 A.M., and be kept open until 8 P.M. of the same day. By section 2 the short title of the Act is to be the "Parliamentary Elections (Metropolis) Act, 1878."

PARLIAMENTARY AND MUNICIPAL REGISTRATION.

[41 and 42 Victoriæ, cap. 26.—22nd July, 1878.]

An Act to amend the Law relating to the Registration of Voters in Parliamentary Boroughs and the Enrolment of Burgesses in Municipal Boroughs, and relating to certain Rights of Voting and proceedings before and Appeals from Revising Barristers.

This Act, which is by section 2 only to apply to England and Wales, is, under section 3, to come into operation on February 1, 1879. Section 4 defines the terms used in the Act. By section 5 it is enacted that for the purposes of "The Reform Act, 1832," and "The Municipal Corporation Acts" the terms "house, warehouse, counting-house, shop, or other building," shall include any part of a house where that part is separately occupied for the purpose of any trade, business, or profession; and any such part may for the purpose of describing the qualification be described as "office," "chambers," "studio," or by any like term applicable to the case. For the purposes of "The Representation of the People Act, 1867," the term "dwelling-house" is to include any part of a house where that part is separately occupied as a dwelling, and the term "lodgings" is to include any apartments or place of residence, whether furnished or unfurnished, in a dwelling-house. The joint use of one part of a house is not to affect the rights arising from the separate occupation of another part of the same dwelling. Section 6 refers to lodgings, and provides that the occupation of some other rooms or place, in addition to his original lodgings, shall not interfere with the rights arising from the occupation of such original lodgings; that the occupation in immediate succession of different lodgings of the requisite value in the same house, shall be equivalent to the continued occupation of the same lodgings; and that in a case of joint occupation of the same lodgings, if the value of the lodgings let unfurnished is not less than £10 for each lodger, then each lodger, if otherwise qualified and subject to "The Representation of the People Act, 1867," is entitled to be registered and vote provided that only two persons being joint lodgers are to be so registered. By

section 7 the period of qualification hitherto reckoned by reference to the last day of July is to be computed by reference to 15th July; and the term "period of qualification" is to include any period of occupation, residence, possession, receipt of rents and profits, and non-receipt of parochial relief or other alms. Section 8 provides for the use of the forms relating to registration in Parliamentary boroughs and burgess list in certain municipal boroughs, given in the schedule to this Act, in substitution for any corresponding forms in the schedules to "The Parliamentary Registration Acts." By section 9 all notices under this Act and "The Parliamentary Registration Acts" are to be published by the overseers, not only in the manner directed by those Acts, but also by being affixed and kept in some public and conspicuous position in or near every post office and telegraph office, and in or near every public or municipal or parochial office within the parish to which the list relates. Section 10 extends to the rates of which the payment is required as a condition of enrolment on the burgess roll, the provisions as to notices of rates in arrear given in section 11 of "The Parliamentary Registration Act, 1843," and section 28 of "The Representation of the People Act, 1867." Any notice required to be given under this section is to be deemed to be duly given if delivered to the occupier or left at his last or usual place of abode, or with some person on the premises in respect of which the rate is payable. In case no such person can be found, then the notice required to be given under this section or under section 28 of "The Representation of the People Act, 1867," is to be deemed to be duly given if affixed upon some conspicuous part of the premises. Section 11 requires registrars of births and deaths to be furnish to the overseers, returns of all males, and, when required, of all women of full age dying within his district, such returns to be made quarterly on or before the 7th April, 22nd July, 5th September, and 7th January, the registrar being entitled to fees for the same as specified in 37 and 38 Vict., cap. 88, section 28. Persons thus returned as dead are to be omitted from lists of voters, and overseers are to allow any person who is registered as a Parliamentary voter of the Parliamentary borough or enrolled as a burgess of the municipal borough to which the returns relate to inspect any such returns in their custody at reasonable times free of charge. Under section 12 returns of persons disqualified by receipt of parochial relief are to be supplied to the overseers by the relieving officer who upon application from the overseers are to produce to them at such place within the parish, and at such time as they require, the books in his possession containing the names of those persons. Under section 13 the poor rate books for the parish within the previous two years are at all reasonable times to be open, free of charge, to the inspection of any person who is registered as a parliamentary voter for the parliamentary borough, or enrolled as a burgess of the municipal borough, and any such voter or burgess may make any copy or take any extract therefrom. Section 14 gives an explanation of 32 and 33 Vict. cap. 41, section 19, as to entering occupier's name in rate book. Section 15 provides for the preparation of lists of parliamentary voters and burgess lists together where the areas of the parliamentary and municipal boroughs are coextensive, and such list is to be made out by the overseers on or before 31st July. This section also contains full details as to the arrangement of these lists.

Section 16 provides for freemen's and other rights, and section 17 for cases where several municipal boroughs are included in one parliamentary borough. By section 18 "The Parliamentary Registration Acts," and not "The Municipal Corporation Acts" are to apply to burgess lists made under this Act. By section 19, lists of persons qualified to be aldermen or councillors, but not to be burgesses, are to be made out at the same time and in the same manner as the burgess lists. Section 20 abolishes the election of assessors in municipal boroughs which are wholly or in part coextensive with or included in the area of a parliamentary borough, and assessors already so elected are to cease to hold office upon the commencement of this Act. By section 21, lists and registers of parliamentary voters and burgess lists may be arranged according to streets. By section 22, where a person is entered in respect of lodgings on the register of voters for the time being in force, and desires to be entered on the next register in respect of the same lodgings, he may claim to be so entered by sending notice of his claim to the overseers of the parish in which his lodgings are situate on or before the 25th July. The overseers are, on or before the last day of July, to make out a list of all persons so claiming, and if they have reasonable cause to believe that any person whose name is entered on the list is not entitled to be registered or is dead, they are to add in the margin of the list opposite his name the words "objected to" or "dead," as the case may be. The lists so made out are to be signed, published, and otherwise dealt with in the same manner as the alphabetical lists mentioned in section 3 of "The Parliamentary Registration Act, 1843," and for the purposes of "The Parliamentary Registration Acts" to be deemed to be lists of voters, and the provisions of "The Parliamentary Registration Acts" as to objections shall apply to such lists. In the case of a person claiming to vote as a lodger, the declaration annexed to his notice of claims is by section 23 to be, for the purposes of revision, *primâ facie* evidence of his qualification.

By section 24 a person incorrectly entered on a list of voters or a burgess list may make a declaration of such inaccuracy before a justice of the peace or other qualified person, and such declaration, duly endorsed by the town clerk, is to be delivered to the revising barrister, who shall receive it as evidence of the facts without proof of the signature unless he has good reason to doubt its authenticity. Such declarations are to be open to inspecton free of charge on any day except Sunday, and before 15th September, and the town clerk is required to supply copies on application at the price of four pence for the folio of 72 words. By section 25, persons making false declaration under this Act are to be guilty of misdemeanour and punishable by fine or imprisonment for a period not exceeding one year. By section 26, notices of objection for the revision of lists of voters are to state specifically the ground of such objections. Section 27 refers to the procedure for the revision of lists of voters, and section 28 defines the duties and powers of the revising barrister under the Act. Section 29 gives the revising barrister power to fine overseers for neglect of duty in the execution of this Act, and section 30 provides for the defrayment of expenses and application of receipts. The revised lists of voters are under section 31 to be delivered to the town clerk, and by section 32 the register of parliamentary voters made up from such lists is to come into operation on the 1st of January next after such revision, and is

to continue in force for a year. The burgess roll made up from such revised lists is to come into force on the 1st of November next after such revision, and to continue in force for a year. Sections 34 to 43 contain miscellaneous provisions for procedure under the Act, including appeal and correction of burgess roll where burgess lists are revised under this Act (35); power for revising barrister to summon witnesses (36); appeal where revising barrister neglects or refuses to state case (37); costs of appeal (38); power to make rules for proceedings at revision courts; rules to be laid before Parliament (39); and service of notices (40). The schedule supplies the necessary forms.

HOUSE OCCUPIERS' DISQUALIFICATION REMOVAL.

[41 and 42 Victoriæ, cap. 3.—25th February, 1878.]

An Act to relieve certain Occupiers of Dwelling-houses from being disqualified from the Right of Voting in the Election of Members to serve in Parliament by reason of their under-letting such Dwelling-houses for short terms.

The purpose of this short statute is to remove doubts which have arisen upon the occupation required by the third section of the "Representation of the People Act, 1867" (30 and 31 Vict., cap. 102). The first section gives the short title as "The House Occupiers' Disqualification Removal Act," and section 2 provides that from the date of the passing of the Act, every man shall be entitled to be registered and to vote under the provisions of the third section of the Act of 1867, notwithstanding that during a part of the qualifying period, not exceeding four months in the whole, he shall by letting or otherwise have permitted the qualifying premises to be occupied as a furnished house by some other person.

MATRIMONIAL CAUSES.

[41 and 42 Victoriæ, cap. 19.—27th May, 1878.]

An Act to amend "The Matrimonial Causes Acts."

Section 2 provides for the making of an order by the court for the costs of the Queen's Proctor's intervention in suits for divorce or nullity of marriage. Section 4 enables a court or magistrate in cases where a husband is convicted of an aggravated assault on his wife, to order that his wife is no longer bound to cohabit with him, such order to have the force of a decree of judicial separation on the ground of cruelty. The court or magistrate is also authorised to order the husband to pay such sum as is considered in accordance with his means for the wife's support, such payment to be enforceable in the same way as an affiliation order; and the court may also direct the legal custody of the children of the marriage under ten years of age to be given to the wife, provided that no order in either of these cases shall be made in favour of a wife who is proved to have committed adultery until such adultery is condoned, and that such order may be discharged on proof that since it was made the wife has committed adultery. All orders under this section are to be subject

to appeal to the Probate and Admiralty Division of the High Court of Justice.

SALE OF INTOXICATING LIQUORS IN IRELAND ON SUNDAYS.

[41 and 42 Victoriæ, cap. 72.—16th August, 1878.]

An Act to prohibit the Sale of Intoxicating Liquors on Sunday in Ireland.

Section 1 extends to the whole of Sunday, the provisions now in force for prohibiting the opening of premises for the sale of intoxicating liquors on parts of that day, the only places excepted being within the Metropolitan Police District of Dublin Metropolis, and within the cities of Cork, Limerick, and Waterford, and the town of Belfast; and within the said police district and within the said cities and town the said hours or times are hereby extended, and are to be up to the hour of two o'clock in tho afternoon, and after the hour of seven o'clock in the evening of Sunday. By section 2 all penalties now in force under the provisions of any Act for selling or exposing for sale, or purchasing, or opening, or keeping open any premises for the sale of intoxicating liquors, or being present in or upon any such premises during any hours or times on Sunday, and all provisions of any Acts now in force in reference to such penalties, are extended to any violation of the provisions of this Act. Section 3 exempts from the operation of this Act sales of intoxicating liquor to lodgers, or sale of intoxicating liquor in packet boats, or in canteens in pursuance of any Act regulating the same, or the sale at any time at a railway station of intoxicating liquors on arrival or departure of trains, or to *bonâ fide* travellers as described in the Licensing Act of 1874. By section 4 the Act came into operation on the 1st of October, 1878; provided that nothing in the Act is to prohibit the sale of intoxicating liquor in pursuance of any licence held at the time of its passing until the expiration of the period for which such licence has been granted. Section 5 gives the short title as the "Sale or Liquors on Sunday (Ireland) Act, 1878." By section 6 its operation is limited to Ireland only; and by section 7 it is to continue in force until 31st December, 1882, and no longer, unless Parliament shall otherwise determine; and on the said day, all the provisions of any Act now in force regulating the hours of opening or keeping open of any premises for the sale of intoxicating liquors on Sunday shall come into operation and take effect as if this Act had not been passed.

WEIGHTS AND MEASURES.

[41 and 42 Victoriæ, cap. 49.—8th August, 1878.]

An Act to consolidate the Law relating to Weights and Measures.

This statute, which contains 87 sections, is by section 1 to be cited as "The Weights and Measures Act, 1878," and by section 2 it is to come into operation on the 1st January, 1879. Part I, sections 3 to 32, gives "The Law of Weights and Measures;" Part II, sections 33 to 61, supplies the rules for "Administration;" Part III, sections 62 to 70, contains miscellaneous provisions; Part IV, sections 71 to 75,

applies the Act to Scotland; Part V, sections 76 to 85, applies it to Ireland; and Part VI tabulates the Acts repealed. Section 3 enacts that the same measures and weights are to be used throughout the United Kingdom. Section 4 provides for the imperial standard of measure and weight in the custody of the Warden of the Standards to continue to be the imperial standards, and sections 6 and 7 provide for the restoration of the standards or the imperial copies. Sections 10 to 12 relate to imperial measures of length; sections 13 to 17 to measures of capacity; section 18 requires the table in the third schedule, setting forth the equivalents of metric weights and measures in terms of imperial weights and measures, to be accepted; section 19 requires all contracts, bargains, sales, or dealings to be conducted by the terms of the imperial weights and measures; and persons using or possessing for use for trade weights or measures not of the denomination of some Board of Trade standard are to be liable to a fine not exceeding 5*l.* in the first case, or 10*l.* for a second offence, with liability to forfeiture of the weights or measures. Sections 25 and 26 impose penalties for using false weights and measures of not exceeding 5*l.* for first and 10*l.* for second offence, with liability to forfeiture of the weights or measures, while section 27 imposes a fine not exceeding 10*l.* or for a second offence 50*l.*, on persons wilfully or knowingly making or selling any false or unjust weight, measure, scale, balance, steelyard, or weighing machine. Sections 28 to 32 provide for the stamping and verification of weights and measures with penalties for false stamping. Section 33 defines the powers and duties of the Board of Trade in the administration of the Act, and sections 34 to 39 provide for the Board's custody and verification of the standards. Sections 40 to 49 provide for the establishment of local standards, and for their verification and production. Section 50 defines the powers of local authorities, and for the expenses they incur under the Act. Sections 56 to 61 contain the rules for legal procedure under the Act.

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3. TRADE AND COMMERCE.

BILLS OF EXCHANGE.

[41 and 42 Victoriæ, cap. 13.—16th April, 1878.]

An Act to declare the Law relating to the Acceptance of Bills of Exchange.

The object of this short statute, as stated in the preamble, is to clear up doubts as to a provision in "The Mercantile Law Amendment Act, 1856," and "The Mercantile Law Amendment Act (Scotland) Act, 1856," where it is enacted that, "No acceptance of any bill of exchange, where inland or foreign, made after the 31st day of December, 1856, shall be sufficient to bind or charge any person, unless the same be in writing on such bill, or if there be more than one part of such bill on one of the said parts, and signed by the acceptor or some person duly authorized by him." The question having arisen as to the true effect and intention of this enactment, and whether the signature of the drawee alone can constitute a sufficient acceptance of the bill so as to satisfy the requirements of the statute, it is enacted by section 1 that

an acceptance of a bill of exchange is not to be deemed insufficient under the provisions of the original Acts because such acceptance consists merely of the signature of the drawee written on such bill. By section 2 it is provided, that nothing in this Act is to affect the validity or invalidity of any verdict or judgment recovered or given before its passing. And section 3 gives the short title as "The Bills of Exchange Act, 1878."

BILLS OF SALE.

[41 and 42 Victoriæ, cap. 31.—22nd July, 1878.]

An Act to consolidate and amend the Law for preventing Frauds upon Creditors by secret Bills of Sale of Personal Chattels.

The object of this statute is to consolidate and amend the law for preventing frauds upon creditors by secret bills of sale of personal chattels. There are 24 sections in the Act, which will, by section 2, take effect on the 1st Jauuary, 1879. Section 4 supplies the interpretation of the terms used in the Act, for the purposes of which by section 5 trade machinery is to be deemed chattels. By section 6 all instruments giving powers of distress are to be deemed bills of sale within the meaning of the Act. By section 7 fixtures or growing crops are not to be deemed separately assigned when the land passes by the same instrument. Section 8 provides that all bills of sale are to be registered within seven days, and to set forth the consideration for which they were given; otherwise, as against all trustees or assignees of the estate of the person whose chattels are comprised in such bill of sale, under the law relating to bankruptcy or liquidations, or under any assignment for the benefit of creditors, as also against all sheriffs' officers and other persons seizing any chattels comprised in such bill of sale, and also as against every person on whose behalf process has been issued, they are to be deemed fraudulent and void so far as regards the property in the bill of sale which at or after the time of filing the petition for bankruptcy or liquidation, or of the execution of the assignment or process, and after the expiration of such seven days, is in the possession or apparent possession of the person making such bill of sale, or of any person against whom the process has issued, under or in the execution of which such bill has been made or given, as the case may be. Section 9 provides for the avoidance of certain duplicate bills of sale. Section 10 relates to the mode of attesting and registering bills of sale. The execution of every bill of sale is to be attested by a solicitor of the Supreme Court, and a copy of such bill, with an affidavit of the time of its being made or given, is to be presented within seven days to the registrar. If such bill is given subject to any condition not contained in the body of it, the condition is to be deemed part of the bill and written on the same paper before registration. In case two or more bills of sale are given, comprising in whole or part any of the same chattels, they are to have priority in the order of the date of their registration respectively as regards such chattels. A transfer or assignment of a registered bill of sale need not be registered. By section 11 all bills of sale must be renewed once at least every five years, otherwise the registration becomes void, but a renewal of registration is not rendered necessary by a transfer or assignment of the

bill of sale. Section 12 prescribes the form of register to be kept. Session 13 refers to the appointment of the registrar; and sections 14 to 17 supply other provisions. By section 18 the fees to be paid and received in common law stamps the following fees, viz., on filing a bill of sale, 2*s.*: on filing the affidavit of execution of a bill of sale, 2*s.*; on the affidavit used for the purpose of re-registering a bill of sale (to include the fee of filing), 5*s.* Sections 19 to 23 contain miscellaneous provisions, and section 24 limits the operation of the Act to England and Wales.

INNKEEPERS.

[41 and 42 Victoriæ, cap. 38.—8th August, 1878.]

An Act for the further Relief of Innkeepers.

The preamble declares that it is just and expedient to give, in addition to the present right of lien, a power of sale to keepers of hotels, inns, and public-houses in respect of goods and chattels deposited with them. Power is given by section 1 to the landlord to sell by public auction goods and chattels which may have been deposited with him or left in the house he keeps where the person depositing or leaving such goods and chattels shall be indebted either for any board or lodging or for the keep and expenses of any horse or other animals. No such sale is to be made until after the property has been for the space of six weeks in such charge or custody, or on the premises, without such debt having been paid, and the innkeeper, after paying himself out of the proceeds of the sale, with the costs and expenses, shall on demand pay to the person depositing or leaving such goods the surplus, if any. There is a proviso that the debt for the payment of which a sale is made shall not be any other or greater debt than the debt for which the goods or other articles could have been retained by the innkeeper under his lien. At least one month before the sale the landlord is to insert in one London and one country newspaper circulated in the district an advertisement of the intended sale and a description of the goods intended to be sold, with the name of the owner or person who deposited or left the same when known. The Act has immediate operation and extends to the United Kingdom. Its short title is "The Innkeepers Act, 1878."

THRESHING MACHINES.

[41 and 42 Victoriæ, cap. 12.—16th April, 1878.]

An Act for the Prevention of Accidents by Threshing Machines.

The preamble recites the desirability of applying to threshing machines the provisions made by certain Acts of Parliament for the fencing of dangerous machinery in factories and mines. Section 1 enacts that the drum and feeding mouth of every threshing machine as defined by this Act is at all times when it is working to be kept sufficiently and securely fenced so far as is reasonably practicable and consistent with its due and efficient working. The owner of such machine, the foreman, engineer, or other person in charge permitting it to be worked without being fenced, or any person, who, during the working of any threshing machine, removes any guard or thing used

as a fence, is to be liable on summary conviction to a penalty not exceeding five pounds. The owner of the threshing machine, or the person for whose service or benefit it is used, is to be liable to the penalty for the insufficient or insecure fencing of the machine, unless he can satisfy the court that he took all reasonable precautions to ensure the observance of this Act. By section 2 the Act is to come into force on the 1st August, 1879, and is not to extend to Scotland or Ireland. By section 3, any person prosecuted for an offence against the Act may, on his own application, be sworn and examined as a witness. Section 4 authorises a constable, at any time, to enter premises on which he has reasonable cause to believe that a threshing machine is being worked contrary to the provisions of this Act, for the purpose of inspecting such machine. By section 5 the term "threshing machine" in this Act is to mean a threshing machine which is worked by steam or by any motive power other than manual labour.

FACTORIES AND WORKSHOPS.

[41 & 42 Victoria, cap. 16.—27th May, 1878.

An Act to Consolidate and Amend the Law relating to Factories and Workshops.

This Act consists of 107 sections followed by 6 schedules. Part I, sections 3 to 32, is devoted to "The General Law relating to Factories and Workshops;" Part II, sections 33 to 66, supplies "Special Provisions relating to particular classes of Factories and Workshops;" Part III, sections 67 to 92, deals with "Administration, Penalties, and Legal Proceedings;" and Part IV supplies "Definitions, Savings, Application to Scotland and Ireland, and Repeal." The short title of the statute, as fixed by section 1, is "The Factory and Workshop Act, 1878," and by section 2, it is to come into operation on 1st January, 1879. Sections 3 and 4 require all factories and workshops to be kept in a sanitary condition, and free from over-crowding, and an inspector, under the Act, is required to give notice of defects to a medical officer of health, or other officer of the sanitary authority. Sections 5 to 9 supply provisions for securing the safety of persons employed by the fencing of dangerous machinery, and repair of grindstones, defects in which are to be reported by the inspector, while it is also enacted that children and young persons, or women, are not to be allowed to clean machinery while it is in motion. Sections 10 to 21 relate to employment and meal hours, the latter of which are to be simultaneous, and during the time allowed all employment is forbidden. By section 20, no child under ten years is to be employed in a factory or workshop, and by section 21, no child, young person, or woman, is to be employed on a Sunday, except in certain cases provided in the Act. Section 22 provides for holdings and half holdings, and the occupier of the factory or workshop who does not comply with the rules laid down is to be subject to a penalty not exceeding 5*l*. Sections 23 to 26 supply the rules for the education of children employed, and binds the occupiers to require certificates from the teacher of a recognised efficient school that the child has given the requisite attendances. Children employed without the production of the certificate are to be held to be so employed in contravention of the Act. Section 25 empowers the Board or managers of the

school attended by a factory child to require from its employer the payment of a weekly sum not exceeding 3*d.*, and not exceeding one-twelfth part of the wages paid by the employer, and after application has been made to the occupier of the factory so long as he employs the child he is to be liable for the weekly sum, which may be recovered as a debt, and may be deducted by the occupier from the child's wages. A child of thirteen years, who has obtained an educational certificate, is to be considered a young person in the terms of the Act, and attendance at a certified day industrial school is to be deemed to be attendance at a certified efficient school for the purposes of this Act. Sections 27 to 30 relate to certificates of fitness for employment. In a factory a young person under the age of sixteen is not to be employed for more than seven, or if the certifying surgeon resides more than three miles from the factory, more than thirteen work days, unless the occupant of the factory has obtained a certificate of the young person's fitness for employment. Section 29 gives the inspector power when he suspects that a child under sixteen years is by disease or bodily infirmity unfitted for work to require the employer to discharge such young person. When a child becomes a young person an occupier is required to obtain a fresh certificate of fitness. Sections 31 and 32 require notice of accidents causing bodily injury or loss of life to be sent to the inspector under the Act. Section 32 requires a certifying surgeon to report on cases of accident. Section 33 commences the long series of special provisions relating to certain factories and workshops, and requires owners to have interiors of factories and workshops limewashed. By section 35 bakers are required to provide a sleeping place as near to the bakehouse as they can. Sections 38 to 41 contain special restrictions as to employment, meals, and certificates of fitness. Sections 42 to 51 contain special exceptions relaxing the general law in certain cases as to employment in factories and bakeries, and section 50 enables Jews to employ young persons one hour a day in addition to the hours allowed in the Act, in the place of the hours on Saturday when their establishment is closed. Section 52 enables the rule as to simultaneous meal hours to be relaxed in cases where manufacturing processes are necessarily carried on during meal times. Section 53 gives employers power to employ young persons 14 hours a day in certain cases; section 54 permits employment for an extra half hour after the end of the regular work time, where a process is in an incomplete state; and section 57 enables the Secretary of State to sanction extra hours in factories driven by water power, where they are liable to be stopped by drought or flood, provided that in the former case the additional employment is not to exceed over more than 96 days in 12 months, and in the latter over 48 days, and in no case beyond the time already lost in the previous 12 months. Section 58 relates to the employment of male young persons on night work in factories and workshops, and section 59 provides that in letterpress printing works, where newspaper printing is carried on more than two nights in the week, a male young person of sixteen years of age and upwards may be employed at night not more than two nights a week as if he were no longer a young person. Section 60 provides for employment of male young persons in glass works according to the accustomed hours, provided the total employment is not for more than 60 hours in one week, and subject

to other conditions. Section 61 exempts from the operation of the Act places where persons are employed at home, as regards provisions for cleanliness and sanitary arrangements, simultaneous meal time and holidays, but the provisions as to certificates of fitness of employment are to apply to such houses. Sections 63 to 66 contain further special provisions. Section 67 empowers the Secretary of State, with the approval of the Treasury, to appoint inspectors, clerks, and servants for the execution of the Act. Sections 68 and 69 define the powers of inspectors. Sections 71 to 74 provide for the appointment of certifying surgeons, poor law medical officers acting for the time in this capacity where there is no certifying surgeon resident within three miles of a factory or workshop; persons injured by the want of fence to machinery, &c.; and for fines on parents for allowing children to be employed in contravention of the Act, or for not causing them to attend school. Sections 89 to 92 define the mode of legal procedure for offences under the Act. Sections 93 to 96 define the terms used in the Act. Sections 97 to 102 give certain exemptions and savings. Sections 103 to 106 apply the Act to Scotland and Ireland, and section 107 relates to the repeal of previous statutes, a list of which is given in the sixth schedule. Sections 75 to 80 supply miscellaneous provisions as to notices by inspectors; regulation of hours by a public clock approved by the inspector; the keeping of registers of persons employed; the affixing at entrances of factories or workshops an abstract of this Act and notices; the printing and writing of notices; and the inspection of weights and measures. Sections 81 to 88 provide for fines on occupiers of factories for not complying with the Act, and for the payment of penal compensation, &c.

CONTAGIOUS DISEASES (ANIMALS).

[41 and 42 Victoriæ, cap. 74.—16th August, 1878.]

An Act for making better provision respecting Contagious and Infectious Diseases of Cattle and other Animals, and for other purposes.

This Act, which has 88 sections and 7 schedules, is divided into four parts:—I, General; II, England; III, Scotland; IV, Ireland. The general provisions took effect on the 30th September, 1878. The first part, sections 1—5, is occupied with references to former legislation on the subject and a definition of terms used in this Act. Section 8 states that the power of the Privy Council under this Act may be exercised by any two of its members, and as regards the making of orders and doings of Acts affecting only particular local authorities, persons, &c., and the appointment of inspectors and other officers, the duty may be performed by the Lord President or a Secretary of State. Section 10 deals with the question of cattle plague and the inspector's duty on its detection, and sections 11 to 15 define the duty of the Privy Council on receipt of information of the existence of disease. Section 16 requires the inspector of a local authority to report the existence of pleuro-pneumonia. Section 22 refers to foot-and-mouth disease with similar provisions. Section 28 supplies general provisions respecting the declaration of infected places and the subsequent removal of the stigma when it is proved to

be free. Section 29 gives the Privy Council power to provide for the slaughter of animals in other cases than those of cattle plague or pleuro-pneumonia. By section 31, persons having diseased animals are required to segregate them and to give immediate notice to a police constable, who is to report it immediately to such persons as the Privy Council may direct. Section 32 gives the Privy Council power to make orders for prevention or checking of disease by publishing placards as to infected districts; by prohibiting the movement of animals in or out of an infected area; by prescribing and regulating the isolation of animals in an infected area; by prohibiting or regulating the removal of carcases, &c., in or out of an infected area; by prescribing and regulating the destruction of carcases, &c., and the cleansing of such areas, and for all other like purposes. Section 34 gives the Privy Council power to make orders relative to dairies, cow-sheds, and milk shops, including the registration with the local authority of all persons engaged in trade as purveyors of milk, for the inspection of their premises, and for securing the cleanliness of the vessels used and the prevention of the contamination of the milk. Section 35 defines the powers of the Privy Council in regard to foreign animals, including the prohibition of their importation, their slaughter or quarantine, and the regulations at ports. Sections 37 to 45 detail the powers of local authorities and their agents in carrying out this Act and the directions of the Privy Council, and sections 46 to 49 refer to the payment of expenses incurred by the local authority and its borrowing powers. Section 50 defines the powers of the police under the Act; sections 51 and 52 state the general powers of inspectors, including the power of detaining a vessel in port when a Privy Council order or regulation of the local authority has not been complied with on board. Sections 53 to 59 contain general provisions, and the last-named section requires a yearly return to be laid before Parliament not later than the 31st March in each year, stating the proceedings and expenditure under this Act for the year ending the 31st of December previous. Sections 60 to 66 detail the procedure against persons guilty of offences under the Act, the fines being a penalty of 20*l.*, or if the offence is committed with respect to more than four animals, a penalty not exceeding 5*l.* for each; or if it relates to carcases or other things, to a penalty not exceeding 10*l.* for every half ton and after one half ton, in addition to the first penalty, of a sum not exceeding 20*l.* Part III, sections 67 to 74, applies the Act to Scotland, and Part IV, sections 75 to 88, applies it to Ireland.

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4. LOCAL GOVERNMENT.

WATER SUPPLY.

[41 and 42 Victoriæ, cap. 25.—4th July, 1878.]

An Act to amend "The Public Health Act, 1875," so far as relates to the supply of Water.

This Act, of which the short title is "The Public Health (Water) Act, 1878," is by section 1 to be construed as one with the principal Act, and is to come into operation on the 25th March, 1879. Sec-

tion 3 makes it the duty of the rural sanitary authority to provide or require provision of sufficient water supply, and lays down the procedure for enforcing such requirement. Section 4 gives an owner the right to appeal against the requirement of the sanitary authority on the ground that the supply is not required, or that the time given for providing it is insufficient, or that it is impracticable to supply the water at a reasonable cost, or that the sanitary authority ought themselves to meet the need, or that the cost ought to be charged on the district. If within 21 days after he receives service of the sanitary authority's second notice he thus memorializes them, they are not to proceed with the work until they are authorized by a court of summary jurisdiction or by the Local Government Board. Section 5 enables owners jointly charged with the cost of water supply to appeal against the apportionment of the cost. Under section 6, houses in rural districts are not be erected or rebuilt until the sanitary authority's officer has certified that there is a sufficient water supply; and any owner who occupies a house, or causes or permits it to be occupied in contravention of this section, is to be liable, on conviction by a court of summary jurisdiction, to a penalty not exceeding 10*l*. Section 7 requires the sanitary authorities to provide for a periodical inspection of the water supply in their respective districts. Section 9 enables the authority to recover rates for water provided by standpipes from the owners or occupiers of houses within 200 feet of such pipes, as if the water had been supplied to the house itself. Sections 10 to 13 supply other miscellaneous provisions, and the schedule gives the forms of notice to be issued by a local sanitary authority requiring an owner to provide a supply of water for an unoccupied house.

METROPOLITAN BUILDINGS.

[41 and 42 Victoriæ, cap. 32.—22nd July, 1878.]

An Act to amend "The Metropolis Management Act, 1855," "*The Metropolitan Building Act*, 1855," *and the Acts amending the same respectively.*

The preamble recites the necessity for better regulations for the erection and extension of houses in the metropolis in proximity to certain roads; and for giving the Metropolitan Board of Works power to require alterations in music halls and theatres to prevent danger from fire and for kindred purposes. By section 6 the sanction of the Board must be obtained for the erection of houses or buildings at less than the prescribed distance from centre of roads, passages, or ways being highways. Section 7 provides that, in case where houses have been erected at less than the prescribed distance from centre of roads, passages, or ways not being highways, the Board may, where it is proposed to convert such ways into highways, require the houses to be set back, so that the external wall or front of such house or building, or the external fence or boundary of such forecourt or space, shall be at a distance not less than the prescribed distance from the centre of the roadway of such road, passage, or way, or at such distance and according to such conditions and terms (if any) as the Board may have sanctioned, and unless and until such last-mentioned notice (if any) has been complied with, such road, passage, or way,

shall not become a highway. It is however provided, that these rules are not to apply to houses in an area which may have been lawfully so occupied within two years before the passing of this Act. Section 8 provides rules of procedure in the case of default to comply with the Board's requirements. By section 9, no street, road, passage, or way (being a highway), formed or laid out for foot traffic only after the passing of this Act shall, except with the consent of the Board, be used for the purposes of carriage traffic, unless the space open for foot traffic and carriage traffic be of the full width of 40 feet where there are houses or buildings on each side thereof, or where there are houses or buildings only on one side thereof, unless there be a distance of not less than 20 feet from the centre of the space open for foot traffic and carriage traffic and the external walls or fronts of such houses or buildings, or if there be forecourts or other spaces left in front of such houses or buildings, the external fences or boundaries of such forecourts or other spaces. By section 10 no streets, roads, &c., formed for foot traffic before the passing of the Act are to be used without the consent of a justice for carriage traffic unless widened. Section 11 empowers the Board in certain cases to require proprietors of theatres and certain music halls in use at the time of the passing of this Act to remedy structural defects. Section 12 authorises the Board to make regulations affecting theatres and music halls licensed for the first time after the passing of the Act, and by such regulations to prescribe the requirements as to position and structure of such houses, rooms, or places of public resort which may, in the opinion of the Board, be necessary for the protection of all persons frequenting them against dangers from fires which may arise in them or in the neighbourhood; provided that the Board may, from time to time, in any special case, dispense with or modify such regulations, or may annex thereto conditions if they think it necessary or expedient so to do. After the making of any such regulations it shall not be lawful for any person to have or keep open any such place of public resort for any of the purposes aforesaid, unless and until the Board grant a certificate to the effect that such place was on its completion in accordance with the regulations made by the Board in pursuance of the provisions of this Act, and in case any such place is opened contrary to the provisions of this enactment, the person offending is to be liable to a penalty not exceeding 50*l.* for every day on which such place is kept open. Where a provisional licence for new premises has been secured, it is not to be confirmed by the licensing authority until the applicant produces a certificate that the regulations and conditions of the Board are complied with. Part II of the Act gives the Board power to make byelaws with respect to sites and foundations, and contains provisions as to buildings, &c., not erected on foundations or areas conformable with byelaws, &c. Under section 19, where dangerous structures are ordered by the Board to be sold, the purchaser may enter upon the land whereon such structure is standing, for the purpose of taking down the same and of removing the materials of which the same is constructed, and any person who refuses to admit the purchaser, his agents or servants, upon such land, or impedes him in removing such materials, shall be liable on conviction to a penalty not exceeding 10*l.*, and to a further penalty of 5*l.* for every day after the first during which the refusal continues. Section 21 gives power to the architect

and persons authorised by the Board, and district surveyor, to enter and inspect theatres, music halls, buildings, and works, and refusal to admit such person, or to afford him all reasonable assistance in such inspection, is to be punishable for each offence by a penalty not exceeding 20*l.* Section 22 gives a like power of inspection with similar penalties for obstruction in the case of houses. Section 23 provides for the recovery of penalties, and sections 24 to 27 exempts Royal Palaces and buildings exempted from the "Metropolis Management Act of 1855," and Acts amending the same, as also the Inner and Middle Temple, Lincoln's Inn, Gray's Inn, Staple Inn, Furnival's Inn, and the close of Westminster Abbey. Section 27 makes a saving of the rights of the Crown and the Duchy of Lancaster.

PUBLIC SWIMMING BATHS.

[41 and 42 Victoriæ, cap. 14.—27th May, 1878.]

An Act to amend the Law relating to Public Baths and Washhouses.

The object of this statute, as stated in the preamble, is to amend "The Public Baths and Washhouses Act" (9 and 10 Vict., cap. 74, and 10 and 11 Vict., cap. 61), in order to provide for the establishment of covered swimming baths, and for other purposes. Section 1 gives the short title as "The Baths and Washhouses Act, 1878," and defines a "covered swimming bath" as a swimming bath protected by a roof or other covering from the weather. Sections 2 and 3 extend to such baths the provisions of the recited Acts and of "The Public Health Act, 1875." The council and the commissioners, including the urban authority referred to in "The Public Health Act, 1875," are empowered by section 4 to provide from time to time covered swimming baths, and make such reasonable charges for the use thereof as they shall think fit, not exceeding the charges mentioned in the schedule, viz., first class baths not exceeding 8*d.* for each person; second class not exceeding 4*d.* for each person; and third class not exceeding 2*d.* for each person. Section 5 gives the council and the commissioners power to close such baths for any period not exceeding five months in any one year, as they shall think fit, from the beginning of November to the end of March, and either to keep the bath closed or to establish in it a gymnasium or other means of healthful recreation, or they may during such period allow the bath to be used as an empty building for such purposes of healthful recreation or exercise as they think fit, and may at any time allow any portion of the public baths not required by the commissioners to be used for holding vestry meetings or other parochial purposes, provided always, that no covered or open swimming bath when closed may be used for music or dancing. Section 6 gives the council or commissioners power to make bye-laws for the regulation of the baths when used in any of the ways specified in section 5; and by sections 7 they are authorized to employ necessary officers and servants for the purpose. By section 8 they may from time to time make such reasonable charges for the use of the gymnasium or other means of recreation sanctioned by the use of this Act, or for the use of any bath as an empty room. Section 9 extends the powers of borrowing given in the original Act to this Act, and the approval of the Local Government Board shall be substituted for that

of the Commissioners of Her Majesty's Treasury in all cases where money is borrowed for the purposes of the principal Act or this Act. Section 10 gives the council and commissioners power to remove offenders from the baths, and enacts that the baths, &c., are to be considered public and open places, so as to make offences against decency therein criminal offences. By section 11 the council and the commissioners by their officers and servants, may refuse admittance to any bath, washhouse, open bathing place, or covered swimming bath, to any person (1) who shall have been convicted of wilfully disobeying any of the byelaws; (2) who shall have been convicted of any offence against public decency in any of such baths, washhouses, open bathing places, or covered swimming baths. By section 12 the council and commissioners have power to make superannuation allowances to officers, &c., employed about baths, &c., within the metropolis; and section 13 provides that the expenses of this Act and income arising from it are to be applied as under principal Act.

CLEOPATRA'S NEEDLE AND OTHER MONUMENTS.

[41 & 42 Victoriæ, cap. 29.—22nd July, 1878.]

An Act for conferring Powers upon the Metropolitan Board of Works with respect to the Obelisk known as Cleopatra's Needle, and other Monuments.

The preamble recites that it would be to the advantage of the metropolis that facilities should be afforded for the maintenance of the obelisk known by the name of Cleopatra's Needle upon the Victoria Embankment, and that other powers should be conferred as in this Act provided with respect to the preservation of monuments, statues, and other works of art from time to time upon any of the said embankments and lands which are vested in and subject to the control of the Metropolitan Board of Works. Section 3 places the obelisk under the care of the Board, and section 4 enacts that any person who injures or disfigures the obelisk, or any monument erected or to be erected on any of the said embankments or lands, or who posts any bill or placard, or who writes, cuts, prints, draws, or marks in any manner any word or character, or any representation of any object, on the obelisk or such monument, shall for every such offence forfeit and pay to the Board a penalty not exceeding 5*l*., to be recovered in the manner provided by "The Metropolis Management Act, 1855," and the Acts amending the same, with respect to the recovery of penalties by summary proceedings. By section 5 all expenses incurred by the Board in respect of this Act, and in execution by them of this Act, are to be deemed to be expenses incurred under the Metropolis Local Management Act of 1855.

5. MISCELLANEOUS.

CONTINUOUS BRAKES ON PASSENGER TRAINS.

[41 and 42 Victoriæ, cap. 20.—17th June, 1878.]

An Act to provide for Returns respecting Continuous Brakes in use on Passenger Trains on Railways.

The second section of this Act requires every railway company twice in every year to make to the Board of Trade returns respecting the use of continuous brakes on the passenger trains running on their railways in the half years ending the last days of December and June. These returns to contain the particulars specified in the schedule, or shall contain such other particulars as the Board of Trade from time to time prescribe. Every return is to be signed by the officer of the company responsible for the correctness of the return, and by the chairman or deputy chairman of the directors of the company, or where there are no directors by the individual or one of the individuals bound to make the return. Any company failing to comply with this section is liable on summary conviction before a court of summary jurisdiction to a fine not exceeding 5*l.* for every day during which the default continues. Any person who makes or is privy to the making of a return under this Act which is to his knowledge false in any particular is to be liable on summary conviction before a court of summary jurisdiction to a fine not exceeding 50*l.*

ABSTRACTS OF PARLIAMENTARY AND OTHER OFFICIAL DOCUMENTS.

1. FINANCE, TAXATION, AND CURRENCY.

NATIONAL REVENUE AND EXPENDITURE.—The subjoined Tables show the gross PUBLIC REVENUE and EXPENDITURE of the United Kingdom in the year ended 31st March, 1878:—

SOURCES OF REVENUE:—	£
Customs	19,969,000
Excise	27,464,000
Stamps	10,956,000
Land Tax and House Duty	2,670,000
Property and Income Tax	5,820,000
Post Office	6,150,000
Telegraph Service	1,310,000
Crown Lands (Net)	410,000
Interest on Advances for Local Works and on Purchase Money of Suez Canal Shares	949,883
Miscellaneous	4,064,415
Total Income	£79,763,298
Income for year estimated in Budget	£79,146,000
Excess of Income over Budget Estimate	617,298

BRANCHES OF EXPENDITURE:—	
Permanent Charge of Debt:—	£
Interest and Management of the Debt	21,583,443
Terminable Annuities	5,547,517
Interest of Exchequer Bills, &c.	104,212
New Sinking Fund	764,825
Interest, &c., not forming part of the above Permanent Charge, viz.:—	
Interest on Loans for Local Purposes	212,827
Interest and Principal of Exchequer Bonds (Suez)	119,923
Other Charges on Consolidated Fund:—	
Civil List	406,754
Annuities and Pensions	308,888
Salaries and Allowances	95,124
Courts of Justice	641,545
Miscellaneous Services (Ordinary)	189,272
Voted Supply Services:—	
Army Services	14,607,444
,, ,, Charges on account of Troops in India	1,000,000
Army Purchase Commission	504,719
Navy Services	10,978,591
Russo-Turkish War (Vote of Credit)	3,500,000
Miscellaneous Civil Services	13,982,553
Customs and Inland Revenue Departments	2,688,267
Post Office	3,185,346
Telegraph Service	1,139,237
Post Office Packet Service	763,000
Total Ordinary Expenditure	£82,403,495
Add, Expenses of Localisation of Military Forces and Fortifications	800,000
Total Expenditure	£83,203,495
Estimated on Budget and Supplementary Votes	£85,669,000
Actual Payments out of Exchequer	83,203,495
Less than Estimates by	3,265,505

CUSTOMS AND EXCISE.—The Produce of the two great sources of PUBLIC REVENUE, CUSTOMS and EXCISE, which together contribute considerably more than One-Half to the NATIONAL INCOME of the UNITED KINGDOM, was as follows in the financial year ending March 31, 1878:—

CUSTOMS DUTIES on Articles usually contributing not less than £1,000 Annually.	Gross Receipts. £ s. d.
Beer, Spruce	2,465 1 9
—— Of other Sorts, including Mum	1,452 3 11
Chicory	67,651 11 1
Cocoa, Cocoa Husks, and Chocolate	44,598 18 10
Coffee	212,622 6 6
Currants	294,330 17 9
Figs	30,016 1 11
Plate, Gold, and Silver	6,163 0 11
Plums, Dried or Preserved, French Plums and Prunelloes	3,649 3 1
Prunes	5,458 6 1
Raisins	157,743 15 1
Spirits, Colonial and Foreign:—	
Rum	2,518,272 9 8
Brandy	2,121,371 6 6
Geneva	115,640 6 10
Of other sorts	789,811 9 10
Tea	4,005,540 6 6
Tobacco and Snuff	8,100,153 9 5
Wine	1,630,887 7 10
All other Articles	2,086 10 2
Loss on Light Gold	—
Charges on deliveries from the Bonded Warehouses	37,043 14 3
	£20,146,958 7 11
Duties collected at the Isle of Man	49,665 14 10
Payments on Account thereof, under 29 & 30 Vict., c. 23	—
Total Customs	£20,196,624 2 9
Drawbacks, Repayments, &c.	153,444 12 3
Net Produce	£20,043,179 10 6

EXCISE DUTIES.	Gross Receipts. £ s. d.
Chicory	2,536 5 10
Licences, viz.:	
Auctioneers, Appraisers, &c.	78,470 0 0
Beer, Cider, and Perry	383,553 12 6¾
Brewers	433,216 0 0
Dog	372,947 15 0
Establishment, viz.:	
Armorial Bearings	83,424 12 0
Carriages	562,678 1 0
Horses	—
Male Servants	155,591 5 0
Game	196,590 0 0
Gold and Silver Plate	40,216 15 9
Gun	76,448 10 0
Hawkers and Pedlars	24,303 1 0
Maltsters	14,594 10 10½
Medicine Vendors	4,175 15 0
Pawnbrokers	32,752 10 0
Refreshment Houses	8,811 6 9
Spirit (Distillers, Dealers, and Publicans)	836,932 10 5¼
Tobacco	88,653 16 5½
Wine and Sweets	208,773 14 11½
Other than the foregoing	7,470 12 8½
Malt	7,940,769 18 11½
Railways	741,944 0 2½
Spirits	15,557,514 17 4
Sugar used in Brewing	526,209 0 0¼
Total Excise	£28,380,578 11 10¼
Deductions on account of Drawbacks, Discounts, Parliamentary Allowances, Repayments, &c.	£670,064 18 5
Net Produce	£27,710,513 13 5¼

STAMPS.—The following table gives the gross receipts from Stamps in the United Kingdom during the year ended the 31st of March, 1878:—

Heads of Duty.	Gross Receipts. £ s. d.
Probates of Wills and Letters of Administration	2,378,145 4 2
Legacies and Successions	3,731,857 10 9
Total Probate and Legacy Duties	6,110,002 14 11
Deeds and other Instruments, not included under the following heads	2,105,299 7 9½
Bills of Exchange	780,102 11 8
Bankers' Notes	434 7 6
Composition for the Duties on the Bills and Notes of the Banks of England and Ireland, and of Country Bankers	144,835 10 0
Cards	14,139 13 3
Gold and Silver Plate	78,609 10 10½
Licences and Certificates	143,804 0 0
Marine Insurances	121,278 18 0
Medicine	125,142 0 7½
Patents for Inventions	168,146 0 0
Receipts, Drafts and other 1*d.* Stamps	839,421 1 5
Total Stamps, exclusive of Fee Stamps	10,631,215 16 0½

Heads of Duty.	Gross Receipts. £	s.	d.
Fee Stamps, viz.:			
Admiralty Court (Ireland)	524	6	0
Bankruptcy Court (England and Ireland)	76,514	17	2
Chancery Court (Ireland)	12,777	15	6
Chancery Fund (Ireland)	2,641	19	2½
Chimney Sweepers' Certificate	100	0	0
Civil Bill Fund (Ireland)	21,738	14	0
County Courts (Ireland)	37	18	6
Civil Service Commission	2,796	4	6
Coal Mines Regulation	207	10	0
Companies Registration	15,805	12	6
Copyhold, &c., Commission	7,208	13	6
Crown Office	1,535	13	8
Divorce and Matrimonial Causes (Ireland)	35	0	0
Explosive Substances	180	0	0
Great Seal Patent	35	0	0
Judgments Registry Fund (Ireland)	2,812	8	0
Judicature	208,189	1	7
,, Probate Court (England)	132,489	4	2
Land Registry (England)	957	7	0
Law Courts (Scotland)	5,105	2	6
Law Fund (Ireland)	10,382	4	4
London Gazette	26,928	6	0
Lord Chancellor's Presentation	464	0	0
Naturalisation	412	0	0
Pedlars' Certificates (Metropolis)	1,400	0	0
Police Courts	8,233	5	6
Probate Court (Ireland)	18,061	3	0
Public Record	588	0	0
Railway Commission	214	7	6
Record of Title (Ireland)	47	2	6
RegisterHouse (Scotland)	46,896	0	10
Registration of Deeds (Ireland)	14,386	18	1
Total Fee Stamps	£619,715	15	6½
Total Stamps	£11,250,931	11	7¼
Drawbacks, Discounts, Allowances, &c.	£219,817	5	0¼
Net Produce	£11,031,114	6	7

NATIONAL REVENUE FROM 1857 TO 1878.—The following table shows the total gross Revenue in each of the financial years ended March 31, from 1857 to 1878, inclusive, and the proportion of receipts per head of population of the United Kingdom:—

Year ended March 31.	Revenue. £	Proportion per head of Population. £	s.	d.
1857	72,334,062	2	12	1
1858	67,881,513	2	8	3
1859	65,477,284	2	6	3
1860	71,089,669	2	9	10
1861	70,283,674	2	8	11
1862	69,674,479	2	8	3
1863	70,603,561	2	8	4
1864	70,208,964	2	7	7
1865	70,313,437	2	7	0
1866	67,812,292	2	5	1
1867	69,434,568	2	5	8
1868	69,600,218	2	5	6
1869	72,591,991	2	6	8
1870	75,434,252	2	8	4
1871	69,945,220	2	4	5
1872	74,708,314	2	7	3
1873	76,608,770	2	8	2
1874	77,335,657	2	8	2
1875	74,921,873	2	6	3
1876	77,131,693	2	7	1
1877	78,565,036	2	7	6
1878	79,763,298	2	7	8

NATIONAL EXPENDITURE FROM 1857 TO 1878.—The following table shows the total amount of National Expenditure for each of the financial years ended March 31, from 1857 to 1878, inclusive, and the proportion of receipts per head of population of the United Kingdom:—

Year ended March 31.	Expenditure. £	Proportion per Head of Population. £	s.	d.
1857	75,588,667	2	14	4
1858	68,128,859	2	8	5
1859	64,663,882	2	5	8
1860	69,502,289	2	8	8
1861	72,792,059	2	10	8
1862	71,116,485	2	9	11
1863	69,302,008	2	8	2
1864	67,056,286	2	6	0
1865	66,462,207	2	5	0
1866	65,914,357	2	4	2
1867	66,780,396	2	4	0
1868	71,236,242	2	6	6
1869	72,069,961 2,902,855	2	8	6
1870	68,864,752	2	4	0
1871	69,548,539	2	4	3
1872	71,490,020	2	5	0
1873	70,714,448	2	4	5
1874	76,466,510	2	7	7
1875	74,328,040	2	5	10
1876	76,621,773	2	6	10
1877	78,125,227	2	7	2
1878	82,403,495	2	9	3

NATIONAL DEBT.—The following table shows the total amount of the Funded Debt of the United Kingdom on the 31st of March, 1877, the Debt created and reduced in the year ended 31st March, 1878, and the balance at the latter date:—

	£	s.	d.
Total Funded Debt on 31st March, 1877 .	712,621,355	3	9
Debt created in year ended 31st March, 1878	314,691	16	0
Total	712,936,046	19	9
Debt reduced in year ended 31st March, 1878	2,093,039	9	9
Balance, being total Funded Debt on 31st March, 1878 . . .	712,936,046	19	9

The following table shows the state of the above Public Funded Debt of the United Kingdom on 31st March, 1878:—

Capital Funded Debt:— Great Britain.	Capitals. £	s.	d.
New Annuities, at 2½ per cent.	3,765,279	9	9
Exchequer Bonds, created per 16 Vict., c. 23, at 2½ per cent.	418,300	0	0
Total, at 2½ per cent .	£4,183,579	9	9
Debt due to the Bank of England, at 3 per cent.	11,015,100	0	0
Consolidated Annuities, at 3 per cent.	389,340,957	5	6
Reduced Annuities, at 3 per cent. . . .	93,443,975	13	11
New Annuities, at 3 per cent.	178,988,692	19	3
Total, at 3 per cent. .	£672,788,725	18	8
New Annuities, at 3½ per cent.	225,746	6	4
Total, Great Britain	£677,198,051	14	9

Ireland.	£	s.	d.
New Annuities, at 2½ per cent.	2,330	0	0
Debt due to the Bank of Ireland, at 3 per cent.	2,630,769	4	8
Consolidated Annuities, at 3 per cent..	4,755,898	15	5
Reduced Annuities, at 3 per cent. . . .	135,076	3	6
New Annuities, at 3 per cent.	26,120,881	11	8
Total, at 3 per cent. .	£33,642,625	15	3
Total, Ireland . . .	£33,644,955	15	3
Total Capital of the Funded Debt of the United Kingdom, on 31st March, 1878 .	710,843,007	10	0

CHARGES ON NATIONAL DEBT.—The following table shows the annual charges on the Funded Debt of the United Kingdom, in the year ended the 31st of March, 1878:—

	Annual Charge. £	s.	d.
Funded Debt	21,358,794	16	9
Terminable Annuities:			
Annuities, per 18 Vict., c. 18, expiring 5 April, 1885. . .	116,000	0	0
Annuities, per 23 & 24 Vict., c. 109, and subsequent Acts, expiring 5 April, 1885 (Fortifications) . .	575,291	0	0
Annuity, per 26 Vict., c. 14, expiring 5 April, 1885. . .	9,983	7	3
Annuities, per 32 & 33 Vict., c. 59, and 29 Vict., c. 5, expiring at various dates in 1885 (payable yearly)	3,617,845	0	0
Annuities, per 35 & 36 Vict., c. 68, expiring 29th March, and 1st August, 1885 (payable yearly), "The Military Forces Localization Act" .	183,758	0	0
Red Sea and India Telegraph Company's Annuity, 25 & 26 Vict., c. 39, expiring 4th August, 1908 .	36,000	0	0
Sinking Fund Annuity on New 2½ per Cents., per 33 & 34 Vict., c. 71, s. 69 .	6,906	14	7
Annuities for Terms of Years, per 10 Geo. 4, c. 24, and 3 Will. 4, c. 14, expiring at various periods	35,236	16	6
Life Annuities, per 10 Geo. 4, c. 24, 3 Will. 4, c. 14, 16 & 17 Vict. c. 45, and 27 & 28 Vict. c. 43 . . .	922,235	18	6
Exchequer Tontine Annuities, per 29 Geo. 3	12,826	13	7

	Annual Charge. £	s.	d.
Management:			
Great Britain . . .	212,142	8	3
Ireland	9,561	18	0
Total amount of charge on 31st March, 1878.	27,096,582	13	5
Charges on Debt created in the year ended 31st March, 1878:—			
Funded Debt:—			
Capital created per Act 39 Vict., c. 5, "The Telegraph (Money) Act, 1876	1,589	8	0
Capital created per Act 40 & 41 Vict., c. 30, "The Telegraphs (Money) Act, 1877 .	7,851	8	0
Terminable Annuities:—			
Annuities (expiring 1885) granted per 32 & 33 Vict., c. 76 (Fortifications) . .	14,431	0	0
Annuities expiring 1885) granted per 35 & 36 Vict., c. 68, "The Military Forces Localization Act." .	95,056	0	0
Annuities for Terms of Years, per 10 Geo. 4, c. 24	2,704	18	0
Life Annuities, per 10 Geo. 4, c. 24, 16 & 17 Vict., c. 45, and 27 & 28 Vict., c. 43	66,339	15	6
Contributors' Shares in Exchequer Tontine Annuities increased.	2,557	12	10
Total Charge created in the year ended 31st March, 1878 .	190,530	1	4
Total	£27,287,112	14	9

Poor Rate Assessments.—The Poor Rate Assessments for 1875–6 as copied into the Income Tax books for England and Wales show a total gross estimated rental of 139,458,522*l*., and a rateable value of 117,957,192*l*., but these amounts include rateable properties to the value of 15,605,978*l*. gross, and 12,467,699*l*. rateable, for which assessments are not made under Schedule A., being in respect of railways, gasworks, waterworks, canals, &c., which are chargeable with Income Tax for profits under Schedule D. The Poor Rate Assessments, therefore, upon houses and lands in England and Wales.

Coinage of the Royal Mint.—The amount of gold, silver, and copper moneys coined at the Royal Mint in each year from 1859 to 1877 was as follows:—

Years.	Gold. £	Silver. £	Copper. £
1859	2,649,509	647,064	8,512
1860	3,121,709	218,403	37,990
1861	8,190,170	209,484	273,578
1862	7,836,413	148,518	352,800
1863	6,997,212	161,172	151,648
1864	9,535,597	535,194	18,067
1865	2,367,614	501,732	57,493
1866	5,076,676	493,416	50,624
1867	496,397	193,842	33,301
1868	1,653,384	301,356	16,328
1869	7,372,204	76,428	20,832
1870	2,313,384	336,798	32,704
1871	9,919,656	701,514	7,616
1872	15,261,442	1,243,836	47,413
1873	3,384,568	1,081,674	46,218
1874	1,461,565	890,604	65,632
1875	243,264	594,000	69,813
1876	4,711,459	234,232	61,450
1877	981,468	420,948	51,146

Produce of Income Tax.—The following is a statement of the produce of Income Tax for each penny in the pound, according to the net amount of the assessments, after deducting sums discharged on various grounds or irrecoverable from 1867–8 to 1872–3 inclusive, to have been as follows, viz.:—

	£	Rate of Duty. d.
1867–8.. ..	1,451,342	5
1868–9.. ..	1,456,500	6
1869–70 ..	1,499,351	5
1870–1.. ..	1,614,761	4
1871–2.. ..	1,674,342	6
1872–3.. ..	1,757,537	4
1873–4.. ..	1,871,800	3
1874–5.. ..	1,945,600	2
1875–6.. ..	1,963,800	2

Poor Rates.—The total receipts from poor rates in England and Wales during the year 1877, including amounts received in aid of such rates, was 12,948,174*l*.; of which 7,400,034*l*. was expended in the actual relief of the poor, 5,598,203*l*. for other purposes, county and police rates, &c., giving a total expenditure of 12,998,237*l*. In Scotland the total amount of receipts was 869,217*l*., and the expenditure 858,907*l*., and in Ireland the receipts were 991,775*l*., and the expenditure 1,018,497*l*.

Bank Rate.—The following Table shows the Average Minimum Rate per cent. of Discount charged by the Bank of England in each Month, in each Year from 1864 to 1877:—

Months.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
January	7½	5½	8	3½	2	3	3	2½	3	4½	3⅝	4½	4⅝	2
February	7	5	7½	3	2	3	3	2½	3	3½	3½	3½	4	2
March	6	4½	6½	3	2	3	3	3	3	3½	3½	3½	3⅞	2
April	6½	4	6	3	2	4	3	2⅝	3⅝	4	3½	3½	2⅞	2
May	8	4½	9¾	3	2	4½	3	2½	4⅝	5¼	4	3½	2	2
June	6½	3¾	10	2½	2	4	3	2⅝	3½	6½	2¾	3½	2	3
July	6½	3¼	10	2½	2	3½	3½	2⅛	3¼	4⅞	3	3	2	2½
August	8	4	8½	2	2	2½	5	2	3½	3¼	3⅝	2¼	2	2⅝
September	9	4	5	2	2	2½	3¼	2⅝	3¾	3¼	3	2	2	3
October	9	7	4½	2	2	2½	2½	2⅞	5⅝	6	3½	3⅛	2	4½
November	8	6½	4	2	2½	3	2½	4½	6½	8½	4½	3½	2	4⅞
December	6½	6½	3¾	2	3	3	2½	3¼	5⅜	5¼	6	3	2	4
Average for the Year	7½	4¾	7	2½	2¼	3¼	3⅛	2⅞	4⅛	4¾	3¾	3¼	2⅝	2⅞

Price of Stock.—The following Table shows the average price per 100*l.* of the Three per Cent. Consolidated Stock of the Public Funds of the United Kingdom in each Month, in each Year from 1864 to 1877:—

Months.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
January	91	89½	87½	90⅜	92⅝	92⅞	92⅜	92⅜	92⅝	92⅜	92⅛	92⅜	93⅞	95½
February	91	89½	87⅜	90⅝	93⅛	93	92⅛	91½	92¼	92⅝	92⅝	92⅛	94 3/16	95 1/16
March	91⅜	89	87	91	93⅛	92⅞	92	92	92⅝	92⅝	92	93	94 3/16	96 7/16
April	91½	91	86⅝	90¾	93⅛	93⅛	93⅜	93	92¾	93¼	92½	93½	94 15/16	95⅝
May	91½	90¼	86½	92⅛	94⅝	93	94¼	93½	93⅝	93⅜	93¼	94	96	94½
June	90⅛	89⅜	86¼	94⅜	94⅞	92⅝	92¼	92	92⅜	92¼	92⅝	93	94½	94⅜
July	90½	90	87⅜	94⅜	94⅝	93	91⅛	93¼	92⅜	92⅛	92⅝	94¼	95¼	94½
August	89⅛	89¾	88¼	94⅜	94	93	90¾	93½	92½	92¼	92⅜	94⅜	96 7/16	95⅛
September	88	89¾	89⅛	94⅝	94⅛	92⅞	92	93⅛	92⅜	92⅛	92⅝	94⅜	95⅝	95½
October	88½	88¾	89⅜	94⅞	94½	93⅛	92¼	92½	92¼	92⅛	91⅞	94 9/16	95 7/16	95¾
November	90⅝	89¼	89¾	94⅜	94⅛	93⅝	92¾	93¼	92⅜	92⅝	93⅛	94⅝	95¾	96 1/16
December	89¼	87½	89	92¾	92⅜	92⅛	97⅜	92¼	91⅝	92	91⅝	93⅜	94	95 1/16
Average for the Year	90⅛	89½	88	93	93⅞	92⅛	92⅛	92¾	92⅛	92⅛	92⅛	93¾	95	95⅜

NATIONAL DEBT.—The following Table shows the total amount of the National Debt at the end of each financial year from 1862 to 1878 inclusive:—

Financial Years ended 31st March	Funded Debt. Capital of Unredeemed Funded Debt, inclusive of Unclaimed Stock and Dividends.	Funded Debt. Estimated Capital of Terminable Annuities (Computed in 3 per Cent. Stock).	Amount of Unfunded Debt.	Total Amount of National Debt, inclusive of Unclaimed Stock and Dividends.
	£	£	£	£
1862	788,229,618	19,388,876	16,517,900	824,136,394
1863	787,422,928	20,716,727	16,495,400	824,635,055
1864	781,712,401	26,442,428*	13,136,000	821,290,829
1865	780,202,104	25,408,370	10,742,500	816,352,974
1866	773,941,190	25,435,034	8,187,700	807,563,924
1867	770,188,625	27,521,513	7,956,800	805,666,938
1868	741,844,981†	56,816,803†	7,911,100	806,572,884
1869	741,112,640	55,471,424	8,896,100	805,480,164
1870	741,514,681	53,130,380	6,761,500	801,406,561
1871	732,043,270	57,969,885	6,091,000	796,104,155
1872	731,756,962	55,749,070	5,155,100	792,661,132
1873	727,374,082	53,558,580	4,829,100	785,761,762
1874	723,514,005	51,289,640	4,479,600	779,283,245
1875	714,797,715	55,311,671	5,239,000	775,348,386
1876	713,657,517	51,911,227	11,401,800‡	776,970,544
1877	712,621,355	49,308,558	13,943,800§	775,873,713
1878	710,843,007	46,335,589	20,603,000‖	777,781,596

* In 1864 the sum of 5,000,000*l.* of the Unredeemed Funded Debt was cancelled, and a Terminable Annuity created in lieu thereof, under the 26th Vict., cap. 25, sect. 2.

† Alterations in amounts of Capital of Unredeemed Funded Debt and of Terminable Annuities chiefly caused by the conversion, in 1868, of Stock into Terminable Annuities.

‡ Including Bonds (Suez Canal) to the amount of 4,000,000*l.* in 1876.

§ Do. do. do. 3,990,000*l.* in 1877.

‖ Do. do. do. 3,929,200*l.* in 1878.

EXCHEQUER BALANCES.—The following Table shows the Balances in the Exchequer at the end of each Financial Year from 1862 to 1878 inclusive:—

Financial Years ended 31st March.	Amount.
	£
1862..	5,288,676
1863..	7,263,839
1864..	7,352,548
1865..	7,690,922
1866..	5,851,314
1867..	7,294,151
1868..	4,781,846
1869..	4,707,258*
1870..	8,606,647
1871..	7,023,435
1872..	9,342,652
1873..	11,992,705
1874..	7,442,854
1875..	6,265,322
1876..	5,119,587
1877..	5,988,650
1878..	6,243,389

* Including 1,000,000*l.* advanced by the Bank of England in aid of Ways and Means.

MISCELLANEOUS REVENUE.—The following is a detailed statement of the amount received into the Exchequer, in the year ended the 31st March, 1878 under the head of Miscellaneous Revenue:—

	£	s.	d.
Small Branches of the Hereditary Revenue . . .	87,081	18	0
Bk. of Eng. (Profits of Issue)	138,578	0	0
Receipts by Naval and Military Departments . .	776,427	17	6
From Indian Revenues .	1,339,422	19	2
Ashantee Expedition . .	2,664	2	9
Army Purchase Commisn.	133	3	4
Receipts by Civil Departments	1,121,640	7	4
Receipts by Revenue Departments	420,616	12	10
Net Profit on Post Office Savings Banks	126,279	14	11
Income of Gazettes . . .	7,713	9	3
Savings on Grants of Parliament, &c.	8,102	18	8
Treasury Chest	19,097	10	6
Isle of Man	9,033	14	7
Conscience Money . . .	5,572	2	10
Rent of Guano Islands . .	1,219	6	0
Casual Receipts	831	6	0
Total	£4,064,415	3	8

2. GENERAL COMMERCE AND NAVIGATION.

NAVIGATION RETURNS.—The subjoined table shows the tonnage of British and Foreign vessels (sailing and steam) entered and cleared, *with cargoes*, at ports in the United Kingdom, from and to foreign countries and British Possessions, from 1859 to 1877:—

Years.	Entered.			Cleared.		
	British.	Foreign.	Total.	British.	Foreign.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1859 ..	5,391,925	3,698,718	9,090,643	6,222,746	4,021,217	10,243,963
1860 ..	5,760,537	4,294,444	10,054,981	6,358,917	4,424,020	10,782,937
1861 ..	6,307,737	4,297,442	10,605,179	6,841,808	4,477,996	11,319,804
1862 ..	6,591,654	4,149,154	10,740,808	7,400,454	4,309,395	11,709,849
1863 ..	7,302,039	3,835,319	11,137,358	7,961,008	3,926,797	11,887,805
1864 ..	7,813,179	3,488,931	11,302,110	8,596,234	3,576,540	12,172,774
1865 ..	8,356,914	3,801,780	12,158,694	9,056,729	3,770,422	12,827,151
1866 ..	9,215,820	4,061,370	13,277,190	9,954,147	4,055,947	14,010,094
1867 ..	9,356,814	3,984,634	13,341,448	10,586,058	4,261,523	14,847,581
1868 ..	9,572,450	4,279,207	13,851,657	10,902,171	4,570,848	15,473,019
1869 ..	10,042,182	4,444,518	14,486,700	11,313,757	4,603,227	15,916,984
1870 ..	10,308,952	4,601,790	14,910,742	11,934,087	4,779,851	16,713,938
1871 ..	11,250,120	5,205,222	16,455,342	13,396 583	5,650,872	19,047,455
1872 ..	12,139,805	5,766,135	17,905,940	13,574,471	5,673,881	19,248,352
1873 ..	12,474,912	6,320,145	18,795,057	13,653,030	5,486,335	19,139,365
1874 ..	12,751,128	6,330,278	19,081,406	14,010,786	5,742,701	19,753,487
1875 ..	12,852,351	6,187.577	19,039,928	14,454 989	5,958,750	20,413,739
1876 ..	13,672,122	7,354,549	21,026,671	15,201,602	6,309,111	21,510,713
1877 ..	14,824,448	7,237,176	22,131,624	15.358.033	5.837,323	21,195.356

IMPORTS INTO THE UNITED KINGDOM.—The following table gives the quantities of the chief articles imported into the United Kingdom in the year ended the 31st of December, 1877:—

Articles.		Quantity.
Animals:—		
Oxen, Bulls, Cows, and Calves	No.	201,193
Sheep and Lambs	,,	874,055
Bacon and Hams	Cwts.	2,820,482
Beef	,,	678,505
Bones, except Whalefins	Tons	112,195
Brimstone	Cwts.	1,085,614
Bristles	Lbs.	2,653,460
Butter	Cwts.	1,637,403
Candles, Stearine	,,	125,369
Caoutchouc	,,	159,723
Cheese	,,	1,653,920
Clocks	No.	687,271
Cocoa	Lbs.	17,056,364
Coffee	Cwts.	1,608.282
Corn, Wheat	,,	54,269,800
—— Barley	,,	12,959,526
—— Oats	,,	12,910,035
—— Maize	,,	30,477,818
—— Other kinds	,,	6,413,678
—— Flour of Wheat	,,	7,377,303
—— —— Of other kinds.	,,	220,033
Total of Corn	,,	124,628,193
Cotton, Raw	,,	12,100,725
Dyeing (or Tanning) Stuffs:—		
Cochineal, Granilla, and Dust	Cwts.	32,094
Cutch and Gambier	Tons	32,018
Garancine	Cwts.	8,993
Indigo	,,	60,640
Madder	,,	19,675
Madder Root	,,	19,491
Shumach	Tons	13,409
Valonia	,,	29,989
Eggs	No.	751,185,600
Fish	Cwts.	1,071,802
Flax and Hemp:—		
Flax, Dressed and Undressed	,,	1,762,726
Tow or Codilla of Flax and Hemp	,,	551,642
Hemp and other like Substances (except Jute), Dressed and Undressed	,,	1,188,079
Jute	,,	3,649,877
Fruits:—		
Currants	,,	1,349.965
Raisins	,,	535,788
Oranges and Lemons	Bush.	3,533,781
Glass of all Kinds	Cwts.	1,141,343
Guano	Tons	152.989
Gutta-percha	Cwts.	26.068
Hair:—		
Goats' Hair or Wool	Lbs.	8,214,990
Hides, Tanned and Untanned	Cwts.	1,565,272
Hops	,,	250,039

Articles.		Quantity.
Lard	Cwts.	592,264
Leather Gloves	Pairs	14,905,908
Meat, Salted or Fresh	Cwts.	130,178
Preserved, other than Salted	,,	469,003
Metals:—		
Copper Ore and Regulus	Tons	149,326
Copper, Unwrought and part Wrought, and old Copper	Cwts.	869,640
Iron, in Bars	Tons	91,817
Iron and Steel Wrought or Manufactured	Cwts.	1,683,921
Lead, Pig and Sheet	Tons	94,486
Tin, in Blocks, Ingots, Bars, or Slabs, and Regulus	Cwts.	275,252
Zinc, Crude, in Cakes	Tons	35,293
—— Manufactures	Cwts.	322,059
Oil, Fish	Tuns	19,365
— Palm	Cwts.	897,264
— Cocoa Nut	,,	195,115
— Olive	Tuns	31,271
— Seed	,,	14,827
— Turpentine	Cwts.	257,323
Oil Seed Cake	Tons	163,606
Paper, for Printing or Writing	Cwts.	239,910
Petroleum, Unrefined	Galls.	391,356
—— Refined	,,	33,474,955
Pork	Cwts.	303,734
Potatoes	,,	7,964,840
Pyrites of Iron or Copper	Tons	679,312
Rags and Paper-making Materials:—		
Rags	,,	17,130
Esparto and other Materials	,,	193,520
Rice, not in the Husk	Cwts.	6,617,603
— In the Husk	Qrs.	544
Rosin	Cwts.	964,157
Saltpetre	,,	268,175
—— Cubic Nitre	,,	1,417,308
Seeds:—		
Clover and Grass	,,	356,136
Cotton	Tons	264,619
Flax and Linseed	Qrs.	1,706,796
Rape	,,	537,234
Silk Knubs or Husks and Waste	Cwts.	24,282
Silk, Raw	Lbs.	4,441,891
—— Thrown	,,	114,417
Skins:—		
Sheep and Lamb, Undressed	No.	7,281,047
—— Tanned, Tawed or Dressed	,,	5,696,484
Seal	,,	763,757
Goat, Undressed	,,	1,835,421
—— Tanned, Tawed or Dressed	,,	6,316,178
Spices:—		
Cinnamon	Lbs.	1,377,029
Pepper	,,	28,643,635
Of all other sorts	,,	15,809,543

Articles.		Quantity.
Spirits:—		
Rum	Pf. Gals.	7,920,150
Brandy	,,	2,962,697
Other Foreign and Colonial Spirits	,,	2,850,246
Total of Spirits	,,	13,733,093
Sugar, Refined and Sugar Candy	Cwts.	3,429,853
—— Raw	,,	16,620,944
—— Molasses	,,	298,261
Tallow and Stearine	,,	1,224,239
Tea	Lbs.	187,515,284
Teeth, Elephants', Sea-Cow, and Sea Horse	Cwts.	12,462
Tobacco, Manufactured, Cigars, and Snuff	Lbs.	3,762,831
—— Unmanufactured	,,	74,362,318
Wine	Gals.	19,568,807
Wood and Timber:—		
Hewn	Loads	2,088,459
Sawn or Split	,,	4,583,451
Staves	,,	116,869
Mahogany	Tons	53,600
Wool,—Sheep, Lamb, Alpaca, and the Llama Tribe	Lbs.	409,949,198
Woollen Rags	Tons	33,408
Woollen and Worsted Yarn:—		
Berlin Wool and Yarn used for Fancy Purposes	Lbs.	976,044
Yarn for Weaving	,,	12,948,662
Yeast, Dried	Cwts.	178,967

EXPORTS OF HOME PRODUCE FROM THE UNITED KINGDOM.—The following table shows the quantities of the chief articles of British and Irish produce and manufactures exported from the United Kingdom in the year ended the 31st of December, 1877:—

Principal Articles.		Quantity.
Alkali	Cwts.	5,685,994
Animals: Horses	No.	2,258
Arms and Ammunition:—		
Firearms (Small)	No.	250,617
Gunpowder	Lbs.	16,154,945
Bags, Empty	Dozs.	4,921,149
Beer and Ale	Brls.	460,818
Books, Printed	Cwts.	84,398
Butter	,,	37,385
Candles, of all sorts	Lbs.	6,085,475
Carriages, Railway	No.	2,404
Cement	Cwts.	4,492,098
Cheese	,,	16,755
Coals, Cinders, and Fuel	Tons	15,420,050
Cordage and Twine	Cwts.	106,238
Corn: Wheat	,,	207,930
—— Wheat Flour	,,	29,002
Cotton Yarn	Lbs.	227,651,402

Principal Articles.		Quantity.
Cotton Manufactures:—		
Piece Goods, White or Plain	Yds.	2,699,282,118
——— Printed, Checked, or Dyed	,,	1,125,255,197
———, of Mixed Materials	,,	13,283,535
Total of Piece Goods	,,	3,837,820,850
Stockings	Doz. Prs.	1,194,337
Thread for Sewing	Lbs.	11,200,489
Fish: Herrings	Brls.	649,748
Glass: Plate	Sq. Ft.	1,157,063
——— Flint	Cwts.	96,170
——— Common Bottles	,,	612,743
——— Of other Sorts	,,	83,511
Hats of all Sorts	Dozs.	888,537
Leather, Tanned, Unwrought	Cwts.	144,431
—— Wrought, Boots and Shoes	Doz. Prs.	436,166
—— Of other Sorts	Lbs.	1,481,225
Linen and Jute Yarn:		
Linen Yarn	,,	19,216,001
Jute Yarn	,,	14,997,659
Linen and Jute Manufactures:—		
Linen Manufactures:		
White or Plain	Yds.	159,274,650
Printed, Checked, or Dyed	,,	14,411,156
Sailcloth and Sails	,,	4,080,721
Total of Piece Goods	,,	177,766,527
Thread for Sewing	Lbs.	2,447,091
Jute Manufactures	Yds.	116,753,003
Metals:—		
Iron, Old, for remanufacture	Tons	23,409
—— Pig, and Puddled	,,	882,059
—— Bar, Angle, Bolt, and Rod	,,	247,990
—— Railroad, of all Sorts	,,	498,256
—— Wire	,,	51,092
—— Hoops, Sheets, and Boiler Plates	,,	200,117
—— Tinned Plates	,,	153,226
—— Cast or Wrought, and all other manufactures	,,	254,608
—— Steel, unwrought	,,	24,292
—— Manufactures of Steel, or of Steel and Iron combined	,,	11,321
Total of Iron and Steel	,,	2,346,370
Copper, Unwrought:—		
Ingots, Cakes or Slabs	Cwts.	231,724

Principal Articles.		Quantity.
Copper, Wrought or partly Wrought:—		
Mixed or Yellow Metal	Cwts.	341,272
Of other Sorts	,,	224,661
Brass of all Sorts	,,	91,841
Lead, Pig, Sheet, and Pipe	Tons	42,467
Tin, Unwrought	Cwts.	121,985
Zinc, Wrought and Unwrought	,,	115,760
Oil, Seed	Gals.	16,548,684
Paper (other than Hangings)	Cwts.	321,155
Salt	Tons	833,701
Silk Manufactures:—		
Broad Piece Goods	Yds.	4,356,097
Soap	Cwts.	299,018
Spirits, British	Gals.	1,530,048
Sugar, Refined	Cwts.	1,119,041
Wool, Sheep and Lambs'	Lbs.	9,548,999
Woollen and Worsted Yarn	,,	26,972,536
Woollen and Worsted Manufactures:—		
Cloths, Coatings, &c., Unmixed and Mixed	Yds.	44,125,206
Flannels, Blankets, Blanketing, and Baizes	,,	16,058,604
Worsted Stuffs, Unmixed and Mixed	,,	194,777,034
Carpets and Druggets	,,	6,454,449

Exports of Foreign and Colonial Merchandise from the United Kingdom.—The following table gives the quantity of the exports of foreign and colonial merchandize from the United Kingdom, in the year ended the 31st of December, 1877:—

Articles.		Quantity.
Bark, Peruvian	Cwts.	23,068
Caoutchouc	,,	79,519
Chemical Manufactures and Products	Value	£74,809
Cocoa	Lbs.	7,425,233
Coffee	,,	124,506,220
Corn, Wheat	Cwts.	922,318
—— Wheat Meal or Flour	,,	24,852
Cotton, Raw	,,	1,512,467
Cotton Manufactures:—		
Piece Goods	Pieces	309,810
Other Articles	Value	£72,057
Drugs, Unenumerated	,,	253,088
Dyeing Stuffs:—		
Cochineal, Granilla, and Dust	Cwts.	16,721
Indigo	,,	46,224
Madder	,,	1,586
Madder Root	,,	3

Articles.		Quantity.
Flax and Hemp:—		
Flax, Dressed and Undressed. . .	Cwts.	13,377
Tow or Codilla of Hemp and Flax.	,,	10,849
Hemp and other like Substances (except Jute), Dressed and Undressed. . . .	,,	153,737
Jute	,,	968,102
Fruit:—		
Currants	,,	166,452
Raisins	,,	87,785
Guano	Tons	28,294
Hair, Manufactures of, and of Goats' Wool	Val.	£20,859
Hides, Tanned and Untanned . . .	Cwts.	437,782
Metals:—		
Copper, Unwrought, Part Wrought, and old Copper .	Tons	14,157
Iron in Bars, Unwrought . . .	,,	42,210
Zinc, Crude, in Cakes	,,	2,591
Tin, in Blocks, Ingots, Bars, or Slabs, and Regulus	Cwts.	77,891
Oil, Palm	,,	383,173
— Cocoa Nut . . .	,,	158,946
— Olive	Tuns	5,548
Opium	Lbs.	251,267
Quicksilver	,,	2,261,446
Rice, not in the Husk .	Cwts.	2,797,969
Saltpetre	,,	27,539
——— Cubic Nitre .	,,	96,682
Seeds, Flax and Linseed	Qrs.	44,342
——— Rape	,,	210,850
Silk, Raw	Lbs.	1,652,935
—— Thrown	,,	17,910
Silk Manufactures . .	Val.	£229,130
Spices, Cinnamon . .	Lbs.	1,328,270
——— Pepper. . . .	,,	14,902,580
Spirits:—Proof		
Rum	Gals.	1,499,168
Brandy	,,	275,592
Geneva, and other Foreign and Colonial Spirits. .	,,	1,465.574
Total of Spirits	,,	3,240,334
Sugar, Foreign, Refined, and Candy .	Cwts.	174,639
——— Unrefined. . .	,,	476,848
——— Molasses . . .	,,	20,151
Tea	Lbs.	35,762,420
Teeth, Elephants', Sea Cow, and Sea Horse	Cwts.	5,968
Tobacco, Stemmed . .	Lbs.	963,849
——— Unstemmed. .	,,	11,353,558
——— Manufactured, viz:—		
Cigars.	Lbs.	207,166
Other Sorts	,,	1,276,807
Wine	Gals.	1,484,420
Wool, Sheep, Lamb, Alpaca, and Llama	Lbs.	187,418,627

Export Markets of the United Kingdom.—The following table, compiled from Returns of the Board of Trade, gives the declared value of the British and Irish produce exported from the United Kingdom to Foreign countries and British possessions in the year ended the 31st of December, 1877, first taking the exports to foreign countries:—

I. Foreign Countries.

Countries.	Value.
	£
Russia, Northern Ports . . .	1,987,536
——— Southern Ports . . .	77,796
Sweden and Norway	2,016,416
Denmark Proper and Iceland.	504,745
——— Danish West Indies.	11,317
Germany	9,308,205
Holland	6,418,239
——— Java, and other Possessions in the Indian Seas	27,362
Belgium	6,455,762
France	11,430,360
——— Algeria	4,819
——— Possessions in Senegambia	4,941
——— Possessions in India .	8
Portugal	619,286
——— Azores and Madeira.	28,968
Spain and the Balearic Islands.	630,299
——— Canary Islands . . .	12,413
——— Fernando Po	5,002
——— West India Islands . .	417,398
——— Philippine Islands . .	22,153
Italy	1,130,725
Austrian Territories . . .	355,719
Greece	118,942
Turkey	380,358
——— Wallachia and Moldavia	40,150
Egypt	53,657
Morocco	72,470
United States.	3,509,079
Mexico	76,205
Central America	42,278
Haiti and San Domingo. . .	14,134
New Granada (United States of Columbia)	15,350
Venezuela	13,998
Ecuador	3,743
Brazil	447,316
Uruguay	53,756
Argentine Confederation . .	91,933
Chili	109,766
Peru	154,637
China (exclusive of Hong Kong)	206,545
Japan	257,122
Western Coast of Africa (exclusive of French and Spanish Possessions separately stated).	288,945
Other Countries	150,302
Total to Foreign Countries .	47,624,155

II. British Possessions.

Countries.	Value. £
Channel Islands	183,762
Gibraltar	67,544
Malta	167,870
Ionian Islands (ceded to Greece 1st June, 1864)	—
North American Colonies	642,524
West India Islands and Guiana	316,276
British Honduras	11,773
Australia	2,217,815
British India	1,280,610
The Straits Settlements	134,239
Ceylon	60,584
Hong Kong	137,091
Mauritius	105,793
Cape of Good Hope and Natal	387,045
West Africa Settlements	40,467
Possessions on the Gold Coast	41,440
Other Possessions	33,967
Total to British Possessions	5,828,800
Total to Foreign Countries and British Possessions	53,452,955

Value of Imports.—The total value of the merchandise imported into the United Kingdom in the year 1877 was 394,419,682*l*. This represents an increase of about 19 millions, or 5 per cent. on the value of the imports in 1876, which was 375,154,703*l*. The import values had been practically stationary in the four years ended 31st December, 1876; an increase of 19 millions is therefore a noteworthy though by no means an unprecedented circumstance, for during the last twenty years excesses of a similar kind, ranging in amount from 17 to 30 millions, have been of frequent occurrence; they have often occurred, too, either at periods like the present, when the value of the exports has been considerably contracted, or when the increase in the exports has been so small as to bear no appreciable relation to the increase in the imports. The increase, although very generally spread throughout all the articles imported, is conspicuous in the articles of wheat and flour, which alone account for an augmentation in value of nearly 13 millions, a result attributed by the Commissioners of Customs to a succession of inferior harvests in this country. Taking the aggregate value of food, wheat and wheat meal included, the figures for the two years are:—1876, 88,231,000*l*.; 1877, 99,480,000*l*.; showing an increase of 11 millions, or 12 per cent. The last occasion on which so large an increase in the importation of wheat took place was in the year 1867, when the value rose from 13 to 25 millions, and the quantity from 23,156,000 cwts. to 34,645,000 cwts. Although the importation of living animals has diminished in value to the extent of about 1½ millions, the deficiency has been met by a very large increase in the quantity of dead meat. Fresh beef chiefly from America has advanced by no less than 172 per cent., the quantity being 468,000 cwts. against 172,000 cwts. in 1876, and the value 1,276,000*l*. against 467,000*l*. Fresh mutton chiefly from Holland and the United States has also been sent in larger quantities, 130,000 cwts. against 92,000 cwts., or 41 per cent, and preserved meats of various kinds have increased in about the same proportion, viz., from 283,000 cwts. to 469,000 cwts. These fluctuations, however, are not of sufficient moment to deserve special attention, as the quantity of animal food received from abroad in every form constitutes but a small proportion of the total quantity consumed in this country. The importation of dead meat will require very extensive development before it can be regarded as affecting the interests of the British agriculturist by displacing the food of home production. The supply of animal food of all kinds from foreign countries was valued in 1877 at 17,019,000*l*. against 18,794,000*l*. in 1876, a decrease of 1,775,000*l*.

Value of Exports.—The total value of the goods of British production and manufacture exported in the year 1877 was 198,893,065*l*. This represents a decrease of 1,746,139*l*. only on comparing the amount with the value of the exports in 1876, or the very small percentage of 0·9. Practically, therefore, the condition of this part of trade, if not actually stationary, is yet not retrograding to any appreciable extent. Comparing the results of the years 1876 and 1877, the export to foreign countries have decreased by 6,810,265*l*., or 5 per cent., and those to British Possessions have increased by 5,064,126*l*., or 7·8 per cent. Taking for the points of comparison the years 1872 and 1877, we find that the value of the exports to foreign countries diminished from 195,701,350*l*. to 128,969,715*l*., a difference of 66,731,635*l*., or 34·1 per cent., and that the value of the exports to the British Possessions increased from 60,555,997*l*. to 69,923,350*l*., or 15·5 per cent. The decrease of 6,810,265*l*. in the value of the British exports to foreign countries is generally distributed, the only countries showing a falling off of more than one million being Russia, Holland, and France. Out of a decrease of 2,004,197*l*. in the export trade with Russia, 839,706*l*. is due to the southern ports, the trade with which was suspended during several months of the year. The decrease in the value of the British exports to Holland amounts to 2,162,805*l*., there being a falling off of 616,000*l*. in cotton yarn, of 340,000*l*. in iron and steel, of 57,000*l*. in seed oil, of 416,000*l*. in worsted yarn, and of 120,000*l*. in woollen and worsted manufactures. A decrease of 1,852,373*l*. in the exports to France is spread over a great number of articles.

VALUE OF IMPORTS AND EXPORTS, 1858–1877.—The Commissioners of Customs in their last report give the following Comparative Statement of the Total Value of Imports and Exports of Merchandise, including Bullion and Specie, into and from the United Kingdom in each year from 1858 to 1877, showing also the percentage excess of Imports over Exports in each year:—

Years.	Imports, including Bullion.	Exports.			Excess of Imports		Percentage Excess of Imports		Percentage Increase or Decrease of			
		British, including Bullion.	Foreign.	Total.	Over British Exports.	Over Exports, British and Foreign.	Over British Exports.	Over Exports, British and Foreign.	Imports over the preceding Year.		Total Exports over preceding Year.	
									Increase.	Decrease.	Increase.	Decrease
	£	£	£	£	£	£						
1858	194,077,022	136,237,632	23,174,023	159,411,655	57,839,390	34,665,367	42·4	21·1	—	—	—	—
1859	216,252,511	166,100,332	25,281,446	191,381,778	50,152,179	24,870,733	30·1	12·9	11·4	—	2.0	—
1860	233,509,069	161,425,995	28,630,124	190,056,119	72,083,074	43,452,950	44·6	22·8	7·9	—	—	·6
1861	236,232,069	145,914,462	34,529,684	180,444,146	90,317,607	55,787,923	61·8	30·9	1·1	—	—	5·
1862	257,373,452	153,318,455	42,175,870	195,494,325	104,054,997	61,879,127	67·8	31·1	8·9	—	8·3	—
1863	278,949,814	173,146,382	50,300,067	223,446,449	105,803,432	55,503,365	61·1	24·8	8·3	—	14·2	—
1864	302,680,448	183,581,353	52,170,561	235,751,914	119,099,095	66,218,534	64·8	28·3	8·5	—	5·5	—
1865	292,534,496	180,928,249	52,995,851	233,924,100	111,606,247	58,610,396	61·7	25·	—	3·3	—	·7
1866	329,577,413	210,556,147	49,988,146	260,544,293	110,921,266	69,033,120	56·5	26·4	12·6	—	11·3	—
1867	299,004,184	195,286,440	44,840,606	240.127,046	103,717,744	58,877,138	53·1	24·5	—	9·2	—	7·8
1868	319,546,203	199,897,826	48,100,642	247,998,468	119,648,377	71,547,735	59·8	28·8	6·8	—	3·2	—
1869	315.961,205	206,331,485	47,061,095	253,392,580	109,629,720	62,568,625	53·1	24·6	—	1·1	2·1	—
1870	332,713.161	218,506,512	44,493,755	263.000,267	114,206,649	69,712,894	52·2	26·5	5·3	—	3·7	—
1871	369,156,307	256,826,833	60,508,538	317,335,371	112,329,474	51,820,936	43·7	16·3	10·9	—	20·6	—
1872	384,301,636	286,593,208	58,331,487	344,924,695	97,708,428	39,376,941	34·	11·4	4·1	—	8·6	—4
1873	404,886,603	284,063,888	55,840,162	339,904,050	120,822,715	64,982,553	42·5	19·1	5·3	—	—	1·7
1874	400,461,889	262,411,714	58,092,343	320,504,057	138,050,175	79,957,832	52·6	24·9	—	1·	—	5·5
1875	407,201,366	251,094,005	58,146,360	309,240,365	156,110,361	97,964,001	62·1	31·6	1·6	—	—	3·
1876	412,208,947	230,103,286	56,137,398	286,240,684	182,105,661	125,968,263	79·1	44·	1·2	—	—	7·4
1877	431,572,481	238,691,184	53,452,955	292,144,139	192,881,297	139,428,342	80·8	47·7	4·7	—	2·1	—

3. TRADE AND AGRICULTURE.

TEA.—The quantity imported in 1877 was 1,979,000 lbs., or 1 per cent. in excess of 1876. The excess is more than accounted for by a larger receipt of Indian tea, an article which is being steadily established in the popular taste. The following table shows the proportion imported from the two principal countries of produce during the last three years, viz. :—

	1875.	1876.	1877.
	Lbs.	Lbs.	Lbs.
China	170,462,000	155,907,000	154,996,000
India	25,427,000	27,814,000	30,940,000

The quantity of tea imported from Holland was 1,417,000 lbs., the produce of Java, coming indirectly through Rotterdam. The quantity of tea in bond at the end of the year (110,910,000 lbs.) is also nearly identical with that remaining at the close of 1876. The export account alone shows any difference worthy of mention, the quantities shipped from this country having been 35,762,420 lbs. in 1877 against 29,129,312 lbs. in 1876, or 22 per cent. increase.

SPIRITS.—The following table shows the quantities of spirits retained for consumption as beverage in the years ended 31st March, 1876, and 31st March, 1877 :—

	England.	Scotland	Ireland.	United Kingdom.
	Gallons.	Gallons.	Gallons.	Gallons.
1876	16,749,140	6,856,534	6,697,455	30,303,129
1877	16,414,904	7,005,803	6,381,284	29,801,991
Increase	..	149,269		
Decrease	334,236	..	316,171	501,138
Percentage of Increase	..	2·17		
,, Decrease	1·99	..	4·72	1·65
Quantity consumed per head of population in 1876	0·677	1·985	1·199	0·900
Population, 1876 (Estimated to middle of year)	24,244,010	3,527,811	5,321,618	33,093,439

For the first time since the year 1868 the returns show a decrease in the consumption of British spirits in the United Kingdom, amounting to a little more than half a million gallons, or 1·65 per cent. The decrease is confined to England and Ireland, and is almost equally divided between those parts of the United Kingdom as regards quantity, but the percentage of decrease is more than twice as great in Ireland as in England. In 1868, when the last decrease occurred, the consumption amounted to 21,019,670 gallons, or ·697 of a gallon per head of the population. In the year ended 31st March, 1877, the consumption had reached 29,801,991 gallons, or ·900 of a gallon per head of the population. There is likewise a decrease in the quantity of foreign spirits unenumerated and not sweetened (which comes more directly into competition with British spirits) entered for home consumption as compared with the previous year, amounting to 359,441 gallons, or 19 per cent., but then the increase in consumption of this description of spirit in 1876 as compared with 1875 was very large, amounting to no less than 72 per cent. The quantity of British spirits exported in 1877 exceeded that in the previous year by upwards of 269,000 gallons, nearly half of which increase is due to spirits sent to Australia. There is also an excess in the quantity of spirits sent to the West Coast of Africa and British India, amounting together to upwards of 96,000 gallons. But the total quantity exported does not exceed the average for some years past.

AGRICULTURE.—The following table shows the Acreage under each Crop, and Fallow, and Grass, and Number of Live Stock, in Great Britain and Ireland upon 25th of June in 1867, 1870, 1874, and 4th June, 1877:—

Description of Crops and Live Stock.	United Kingdom, including the Isle of Man and Channel Islands.			
	1867.	1870.	1874.	1877.
Corn Crops.	Acres.	Acres.	Acres.	Acres.
Wheat	3,367,876	3,500,543	3,630,300	3,168,540
Barley or Bere	2,259,164	2,371,739	2,287,987	2,417,588
Oats	2,750,487	2,763,300	2,596,384	2,754,179
Rye	52,865	65,166	47,228	60,146
Beans	536,298	530,095	559,044	497,879
Peas	318,090	317,198	310,547	311,797
Total	9,284,780	9,548,041	9,431,490	9,210,129
Green Crops.				
Potatoes	492,217	587,661	520,430	512,471
Turnips and Swedes	2,173,850	2,210,911	2,133,336	2,073,455
Mangold	258,126	306,531	322,614	358,055
Carrots	15,923	15,259	13,927	15,953
Cabbage, Kohl-Rabi, and Rape	133,692	143,930	169,285	182,710
Vetches, Lucerne, and any other Crop (except Clover or Grass)	424,355	322,438	421,678	442,202
Total	3,498,163	3,586,730	3,581,270	3,584,846
Other Crops, Grass, &c.				
Flax	*—	23,957	9,394	7,481
Hops	64,284	60,594	65,805	71,239
Bare Fallow or Uncropped Arable Land	922,588	610,517	660,206	616,147
Clover Sanfoin, and Grasses under Rotation — For Hay	—	2,069,233	2,045,688	2,175,897
Clover Sanfoin, and Grasses under Rotation — Not for Hay	—	2,435,651	2,295,054	2,317,319
Total	3,989,974	4,504,884	4,340,742	4,493,216
Permanent Pasture (exclusive of Heath or Mountain Land) — For Hay	Not ascertained.	3,067,151	3,279,245	3,758,651
Permanent Pasture (exclusive of Heath or Mountain Land) — Not for Hay		9,005,705	9,898,767	9,969,704
Total	11,36,036	12,072,856	13,178,012	13,728,355
Orchards: Arable or Grass Land used also for Fruit Trees	Not ascertained.		150,526	163,290
Market Gardens			37,907	37,859
Nursery Gardens: for growing Trees, Shrubs, &c.			11,743	11,952
Woods, Coppices, and Plantations			2,187,078	2,187,078
Live Stock.	No.	No.	No.	No.
Horses: used solely for Agriculture, Mares kept solely for breeding, and unbroken Horses	—	1,266,709	1,311,739	1,388,582
Other kinds (subject to Licence Duty in Great Britain)	—	823,266	915,000	915,000
Cattle	4,993,034	5,403,317	6,125,491	5,697,933
Sheep	28,919,101	28,397,589	30,313,941	28,161,164
Pigs, exclusive of those kept in Towns and by Cottagers	2,966,979	2,171,138	2,422,832	2,498,728

* Included with unenumerated Green Crops.

THE BOOK AND PAPER TRADE.—The growth of the export book trade of the United Kingdom is illustrated by the Statistical Abstract issued by the Board of Trade, which shows a total export of 84,398 cwts. of printed books in 1877, as compared with 82,089 in 1876, but this, although a slight recovery from the fall which took place in the latter year, was still under the figures of 1875, when the quantity was 85,777 cwts., the highest point reached in the last fourteen years. The quantity exported in 1863 was only 32,892 cwts. Turning to the declared value of these exports, we find it stood last year at 897,742*l.* as compared with 881,839*l.* in 1876, and 904,792*l.* in 1875, the year which was highest in value as well as in quantity. The growth in value of the literary exports in the fourteen years has been in almost the same ratio as in quantity, the value in 1863 being 456,829*l.* The value of the imports of paper as returned in the Report of the Commissioners of Customs recently issued shows a slight falling off in 1877 as compared with the previous year. In 1877 it was 1,283,000*l.* against 1,284,000*l.* in 1876, and it is noteworthy that paper is one of the few articles wholly or in part manufactured in which our import trade shows a reduction in value. The quantity imported was 239,910 cwts. in 1877, and 259,510 in 1876. In our exports of paper, on the other hand, there was an increase not only in quantity but in value in 1877, as compared with 1876, the net rise in value being 42,710*l.*, and in bulk 34,660 cwts. There was also an increase of 109,441*l.* in the value of the exports of rags and other material for making paper. Looking at the various countries with which we have an extensive trade in paper, we find that our imports from Germany have more than doubled in value in the last four years, having risen from 136,039*l.* in 1873 to 278,191*l.* in 1877. The gross quantity of paper for printing or writing imported from all countries into the United Kingdom has been nearly doubled in the last fourteen years, as shown in the elaborate tables included in the Statistical Abstract of the United Kingdom just issued. In 1863, the first year included in the present tables, it stood at 133,402 cwts. and last year it was 239,910 cwts. The quantity of rags imported for paper making has fluctuated, but was 8,000 cwts. less in 1877 than in 1863, whereas the quantity of Esparto and other materials imported for the same purpose has steadily grown from 20,065 cwts. in 1863 to 193,520 cwts. in 1877, and the latter year showed an excess of 46,000 cwts. on 1876. The value of the Esparto and other materials imported in 1863 was 90,132*l.*, while last year it was 1,471,554*l.*

MALT.—The quantity of malt charged with duty in the United Kingdom in the year ended 31st March, 1877, was 60,526,682 bushels, being an increase of 1,533,273 bushels, or 2·59 per cent. over the preceding year, and an increase on the quantity recorded on any previous year. In accounting for this exceptionally great increase, the Commissioners of Inland Revenue remark that although the barley crop of the summer of 1876 was below the average in quantity, the grain was harvested in so dry a condition as to enable maltsters to commence their operations at an unusually early period, the largest increase occurring in the earlier months of the harvest, while there is a falling off in the latter part of the malting season. The average price of best pale malt in 1875-6 was 73*s.*, and in 1876–7 it was 71*s.*

WATER AND GAS IN LONDON.—During the year 1877 the several water companies realised a gross revenue of 1,246,866*l.*—including 1,232,988*l.* by water rents,—of which 492,251*l.* went in working expenses, and 754,615*l.* in the profits of capital. The net profit of the existing capital was at the rate of 6·5 per cent. London was supplied with gas by the different companies at a cost of 2,744,497*l.* The working expenses were 2,460,896*l.*; but in addition to the meter rents the companies got 832,838*l.* from the sale of coke and from other sources, making the gross revenue 3,577,335*l.*, and the profit 1,116,439*l.*, that being the difference between the working expenses and the gross revenue. The profits of capital were at the rate of 9·8 per annum. The capital engaged in the gas and water companies was 23,023,205*l.*, which realised in the year that ended on April 1, 1877, no less than 1,871,054*l.* That was 8·1 per cent. all round.

COTTON.—The imports of raw cotton for manufacture in 1877 showed a decrease on those received in 1875 and 1876 of about 1¼ million cwts., or 9 per cent., and in value a diminution of 10¾ millions as regards 1875 and 5 millions as regards 1876, the actual figures being—

	Quantity.	Value.
	Cwts.	£
1875	13,324,564	46,259,822
1876	13,284,454	40,180,880
1877	12,100,725	35,420,852

The importation of this article in 1877 is smaller than any that has taken place since the year 1870, when the quantity was also about 12 million cwts. There appears to have been only a comparatively slight falling off in the receipts from the United States, viz., 183,000 cwts., the deficiency being mainly conspicuous in the imports from British India, which represent a de-

crease of 732,000 cwts., or no less than 29 per cent. on the figures of the previous year. There has been a yearly decline in the supply of Indian cotton since 1874, and as will be seen from the following figures the scale has been one of rapid descent:—1874, 3,678,000 cwts.; 1875, 3,443,000 cwts.; 1876, 2,463,000 cwts.; 1877, 1,730,000 cwts. The quantity received in 1877 was not quite one half of that received 4 years previously. Egyptian cotton shows a falling off of 202,000 cwts., and the cotton of other countries of minor importance, such as Brazil and other South American States, exhibits a decline of 65,000 cwts. The average import value of raw cotton in 1877 was 6½*d.* per lb. against 6⅛*d.* per lb. in 1876, and 7⅛*d.* per lb. in 1875.

Wine.—There was a slight reduction in the consumption of wine in the United Kingdom in 1877 as compared with 1876, the number of gallons having diminished from 19,950,000 gallons to 19,568,000 gallons, or 2 per cent. only on a comparison of the figures for the two years 1876 and 1877. Red wine from France fell off by about 536,000 gallons. This is the largest difference to be found in the importations from the wine-producing countries, and is accounted for by the circumstance that the imports in 1876 were unprecedentedly large, owing to the highly productive vintages of 1874 and 1875. The quantity brought in 1877 was 4,832,000 gallons, a very heavy importation and one that only suffers somewhat by comparison with the importation of a year which was quite remarkable for its extent. The white wines of France show an increase of about 109,000 gallons. The imports of wine from Portugal just exceeded four million gallons, a quantity almost identical with that imported in 1876, but smaller by half a million gallons than that of 1875. Spanish wine (red and white together) was also imported in quantities that do not differ to any appreciable extent from those shown in the two preceding years. In 1875 the total quantity was 6,891,000 gallons; in 1876, 6,895,000 gallons; in 1877, 6,803,000 gallons. But the wines of Italy and Sicily have increased by 94,000 gallons. The proportion of red and white wines were, red, 10,437,000 gallons; white, 9,131,000 gallons.

Irish Agricultural Statistics for 1878.—The number of holdings in Ireland is 600,000. The total acreage under crops is 5,203,000 odd, showing a decrease of 61,196; the decrease in cereals was 31,174; in green crops, 37,249. The number of acres under grass is 10,124,745; fallow, 16,971; woods and plantations, 330,816. There is an increase in live stock, that is, in horses and mules, 9,953; sheep, 106,721; goats, 13,324; and a decrease in cattle of 12,847; and in pigs of 199,372. The number of scutching mills in Ulster is 1,162; Leinster, 13; Munster, 20; and Connaught, 17.

Mining Statistics.—From the reports of the inspectors of mines for the year 1877 it appears that the gross produce of the coal, ironstone, fireclay, and shale mines in Great Britain and Ireland during the year was—coal, 134,179,968 tons; ironstone, 12,014,356 tons; fireclay, 1,813,541 tons; and shale, 838,395 tons. The quantity of coal, the chief of our mineral produce, was only very slightly above that for the preceding year. A decreased output is shown in the Northumbrian and North Durham, South Staffordshire and Worcestershire, West Lancashire, South Wales, and Scottish districts, while there has been in other districts a counter-balancing increase. The output has been maintained, generally speaking, with the employment of fewer hands. In South Durham, 56,445 were employed, against 58,380 in the previous year; in South Wales, 44,812, against 46,319; and in West Scotland, 27,984 against 29,045. Thus, there is the satisfactory sign of an increased individual output, from 310 to 318 tons yearly per collier in West Scotland; from 278 tons to 301 tons in North and East Lancashire; and in other districts in somewhat similar ratio. Increased liability to danger of fatal accident appears to be shown; but there have been, in the year to which the statistics relate, heavy fatalities which raise the liability above its normal proportion. The total of ironstone raised was 12,014,356 tons, which appears to be a slight increase on the figures for the previous year. Of this total, Yorkshire (chiefly Cleveland) contributed 6,539,199 tons; North Staffordshire, Cheshire, and Shropshire, 2,183,030 tons; West Scotland, 1,723,161 tons; East Scotland, 893,222 tons; and South Staffordshire and Worcestershire, 206,452. As to fireclay, the production is 1,813,541 tons; the northern coal field contributing 628,276 tons, and Yorkshire 188,346 tons of the output. Of "shale, &c.," the production is returned as 838,395 tons; and the largest contributors are—East Scotland, 581,351 tons; North Staffordshire, Cheshire, and Shropshire, 110,500 tons; and West Scotland, 104,217 tons: the other districts yielding comparatively trivial amounts. It is to be noticed that the increase of the average yield is traceable chiefly to the larger contributing districts; and it is evident that there is a tendency, due to the low prices to which minerals have now fallen, to increase the yield of the larger mines, and thus to spread the establishment charges over a wider area. There is in addition to this, in the case of our most valuable mineral, a more proportionate increase of the output in the coal-yielding districts; but even in these the output has been affected in some degree by the comparative cheapness with which coal can be produced.

4. POPULATION, PUBLIC EMPLOYMENT, AND VITAL STATISTICS.

LUNACY STATISTICS.—The 32nd report of the Commissioners in Lunacy to the Lord Chancellor shows that the total number of registered lunatics, idiots, and persons of unsound mind in England and Wales on the 1st day of January last was 68,538, being an increase of 1,902 on those returned for the 1st of January, 1877. The number of male lunatics was 31,024, and of female lunatics 37,514. These numbers do not include 265 lunatics so found by inquisition, who reside in charge of their committees elsewhere than in asylums, registered hospitals, and licensed houses. Among the "paupers" are classed all who are maintained, wholly or in part, at the cost of parishes, unions, counties, and boroughs; while the "private" patients include not only those supported entirely by their relatives or friends, but also the soldiers, sailors, and criminal and other lunatics maintained by the State at the Royal India Asylum, at the Netley Abbey Military Hospital, at Grove-hall, Bow, at the Yarmouth Naval Hospital, and at the Broadmoor Criminal Asylum respectively. Thus distinguished, the total of 68.538 on the 1st of January last consisted of 4,172 males and 3,520 females of the private, and of 26,852 males and 33,994 females of the pauper class. The increase of the year is represented by 85 males and 10 females among the private, and by 774 males and 1,033 females among the pauper patients. Among the private patients the increase for the year has been below the average of the last ten years; among the paupers it has been somewhat above the average; while, if both classes be taken together, it will be found that the actual increase now stated has been exceeded on four previous occasions during the 20 years of fully-recorded experience—viz., in 1863, when the increase for the year was 1,989; in 1868, when it was 1,914; in 1869, when it was 2.177; and in 1871, when it was 2,042. The following are the particulars of the numerical changes since the 1st of January, 1877, having regard both to the classification and the distribution of the patients. The private patients have increased in county and borough asylums by 25: in registered hospitals by 43; in licensed houses by 15; in the naval, military, and Indian asylums by 2; and the "single patients of the private class by 16; while at the Broadmoor Criminal Asylum the private patients (that is, those maintained by the State) have decreased by 6. The pauper patients have increased in county and borough asylums by 2,215; in registered hospitals by 4; and in workhouses by 227. This class has, on the other hand, decreased in licensed houses by 535, in the Broadmoor Criminal Asylum by 6, and by 98 "out-door paupers." The distinguishing feature in the above changes has been the large increase of pauper patients in county and borough asylums and their diminished number in licensed houses. This has been in a large measure due to the opening, during the year, of the third asylum for Middlesex at Banstead, and the removal to this and the two other county asylums of Middlesex of patients previously in metropolitan licensed houses. The further reduction in the number of private patients in the Broadmoor Asylum is owing to a continuance of the system which has been in operation for the last four years, of not sending thither male convicts becoming insane while undergoing sentences of penal servitude, but treating them as a class in one of the convict prisons. No returns were made to the Commissioners as to these criminal patients, nor had they any official knowledge of their number. The ratio of lunatics to the population on the 1st of January last was 27·57 per 10,000.

HEALTH OF LARGE TOWNS.—In the death-rates of the twenty largest English towns in the year 1877, Portsmouth and Brighton with respective rates of 17·4 and 18·7 stand first. The rate of mortality from the seven zymotic diseases was lower in Brighton, (1·9) than it was in Portsmouth (2·7) Liverpool (26·5) and Manchester (27·4) stand last on the hygienic scale. In 1877 there were ten towns which had a death-rate higher than that of London (21·9): although in some of them, among which may be mentioned Newcastle, Leeds, Sheffield, and Manchester, there is a marked reduction in the death-rate during the last five years. One of the most noteworthy features in these returns is the gradual reduction in the mortality from fever, which destroys so many persons in the prime of life. In 1875 the aggregate deaths from fever in 17 of our large English towns were 5,475; these have declined year by year to about half the number, so that in 1877 there were 2,891. There was a striking reduction in the number of deaths from diarrhœa in each of the twenty towns, last year, partly the result of a summer temperature below the average. At Greenwich the mean temperature of the three summer months was 1°·9 below the average of 36 years.

VIOLENT DEATHS IN LARGE TOWNS.—The deaths by violence in London in 1877 were 2,672, a number 174 less than the corrected annual average. Four were executions; 78 were homicides; and 273 were suicides, including 20 by gunshot wounds, 55 by cuts or stabs, 49 by poisons,

44 by drowning, 81 by hanging, and 24 by other means. The deaths by accident or negligence, which had increased since 1871, fell to 2,293 in 1877, or 87 below the corrected average; 957 of them were caused by fractures or contusions, 548 by suffocation, 316 by drowning, 247 by burns and scalds, 67 by poisons, 24 by wounds, and 134 by other means. Liverpool with its shipping trade lost more of its population by violent deaths than other of the 20 large English towns, for there 1·21 per 1000 died in 1877 by violence; Birmingham with its manufacturing industries stands next with a death-rate by violence of 1·10, then follow Newcastle-on-Tyne with its collieries 0·95, Manchester with its factories 0·85, Hull 0·82, Sunderland 0·78, and then with its crowded thoroughfares, and its passengers by road and rail, London with a death-rate by violence of 0·76. No fewer than 227 persons lost their lives from horses or conveyances in the streets of London, against an average in the previous four years of 219. The drivers of tramcars are more careful than they were, for only 4 deaths were recorded by this description of vehicle in 1877, whereas the average of the previous four years was 13. The deaths from vans and waggons are increasing; in 1876 there were 78, last year there were 92. Sixteen persons were killed in various ways by horses, 13 by carriages, 13 by omnibuses, 26 by cabs, 61 by carts and drays, and 2 by vehicles not described. The number of persons reported by the police as injured by accidents in the streets of London last year was 3,107, against 2,974 in 1876.

BIRTHS, MARRIAGES, AND DEATHS.—The following table shows the total number of births, deaths, and marriages in England and Wales, and Scotland, from 1859 to 1877, and Ireland, from 1865 to 1877:—

ENGLAND AND WALES.

Years.	Births.	Deaths.	Marriages.
1859	689,881	441,790	167,723
1860	684,048	422,721	170,156
1861	696,406	435,114	163,706
1862	712,684	436,573	163,830
1863	727,417	473,837	173,510
1864	740,275	495,531	180,387
1865	748,069	490,909	185,474
1866	753,870	500,689	187,776
1867	768,349	471,073	179,154
1868	786,808	480,622	176,962
1869	773,381	494,828	176,970
1870	792,787	515,329	181,655
1871	797,428	514,879	190,112
1872	825,907	492,265	202,267
1873	831,809	494,003	205,460
1874	854,307	526,701	201,605
1875	850,187	546,317	200,980
1876	887,464	510,308	201,835
1877	887,055	500,348	194,343

SCOTLAND.

1859	106,543	61,714	21,201
1860	105,629	68,170	21,225
1861	107,036	62,287	20,828
1862	107,138	67,159	20,544
1863	109,325	71,421	22,087
1864	112,445	74,303	22,675
1865	113,126	70,821	23,577
1866	113,639	71,273	23,629
1867	114,115	69,024	22,521
1868	115,673	69,386	21,853
1869	113,395	75,789	22,083
1870	115,423	74,067	23,788
1871	116,127	74,644	23,966
1872	118,873	75,741	25,580
1873	119,738	76,857	26,730
1874	123,795	80,676	26,247
1875	123,693	81,785	25,921
1876	126,749	74,122	26,503
1877	126,824	73,946	25,790

IRELAND.*

1865	144,970	93,154	30,802
1866	146,237	93,598	30,151
1867	144,318	93,911	29,796
1868	146,108	86,803	27,753
1869	145,659	89,573	27,277
1870	150,151	90,695	28,835
1871	151,665	88,720	28,960
1872	149,292	97,577	27,114
1873	144,592	97,840	26,566
1874	144,411	92,352	25,201
1875	138,382	98,243	24,259
1876	140,438	92,499	26,503
1877	139,498	93,509	25,078

THE HEALTH OF LONDON.—The Registrar-General in his Report on the Health of London and other large cities remarks that the metropolis maintains its position as the healthiest city in the world. During the past year its prosperity was indicated by a birth-rate above the average of the previous ten years, while a remarkably low death-rate bears testimony to the success which has attended the efforts that have been made during the last quarter of a century to promote the public health and safety. Since 1871 the metropolis has received an accession of more than a quarter of a million of souls: the population at the middle of the year 1877 being estimated at 3,533,484; but notwithstanding this large additon there is a remarkable reduction in the mortality in recent years. The mean death-rate of the seven years 1863–70 (excluding the year 1866, when cholera was epidemic), was 24·4 per 1,000, whereas the mean rate in the seven years 1871–77 was

* Owing to the defective state of the Registration, the figures for births, deaths, and marriages in Ireland are only an approximation to the real numbers.

22·7. The deaths registered in London in 1877 amounted to 77,002, they were at the rate of 1,481 weekly, 211 daily. 39,806 of them were of males, and 37,196 were of females. The comparatively low temperature in the summer, and excessive rainfall in the first three months of the year, amounting to 8·3 inches, or 3·3 above the average of sixty-two years, were apparently favourable to the public health, for the death-rate of the year, 21·9 per 1,000 of population, was remarkably low: with the exception of the two years 1850 and 1872, when the mortality was at the rate of 21·0 and 21·5 respectively, so low a rate has not been observed for the last thirty-eight years, and the decline in the last three years from 23·8 in 1875 to 22·3 in 1876, and to 21·9 in 1877, deserves to be noted. London is divided into five groups of registration districts; the mortality of the year 1877 was lowest in the western group, 19·1, where the average in the thirty-eight years 1840–77 was 22·4. In the southern group it was low, 21·3, while the average was 24·2. In the northern group the rate, 21·8, was also low, while the average was 22·7. In the central group the death-rate, 24·1, was high, against an average of 25·2, while the highest rate is observed in the eastern group, 24·4; the average in the thirty-eight years being 25·9.

5. CRIME, PAUPERISM, AND ACCIDENTS.

SMUGGLING.—There was an increase in the total quantity of cigars and tobacco seized in 1877, as compared with the preceding year, to the extent of 3,420 lbs., or 29·6 per cent., and a decrease in the quantity of spirits seized to the extent of 22 gallons, or 8 per cent. The total numbers of seizures and of the convictions exceeded those of 1876 by 15, or 1·2 per cent., and 23, or 2 per cent., respectively. The increase in tobacco and cigars was 3,420 lbs., and there was a decrease in spirits, 22 gallons. The explanation of the unusual percentage of increase in the quantity of tobacco and cigars seized in 1877 was caused by a large seizure at Bradford.

FIRES IN LONDON DURING THE YEAR 1877.—Captain Eyre M. Shaw, Chief Officer of the Metropolitan Fire Brigade, reported to the Metropolitan Board of Works that the number of fires attended during 1877 was 1,533, showing a decline of 99 from the number in the preceding year, and being 87 below the average in the ten years 1867–76. Ten per cent. of the fires attended in 1877 were described as serious; in 1876 eleven per cent. were so described. Life was seriously endangered at 88 of the fires in 1877, and in 24 cases life was lost. The lives of 165 persons were seriously endangered, of which 136 were saved and 29 lost. The numbers of lives lost by fires in London in the three preceding years were 23, 29, and 35 respectively. The establishment of the Metropolitan Fire Brigade at the end of the year was distributed at 50 engine, 108 escape, and 4 floating stations. The number of fire engines at these stations was 138, showing an increase of 17 upon the number in the previous year; 3 were floating steam engines, 27 land steam engines, and 108 manual engines. The number of fire escapes and long scaling ladders was 141, showing a further increase of 5 upon the numbers in recent years. The strength of the brigade was 406 of all ranks, including the chief officer and the superintendents, and exceeded by 6 the strength in the previous year. The number of firemen employed on the several watches kept up throughout the metropolis was 94 by day and 174 by night. The cases of injury occurring in the brigade during the year were 90 against 70 in 1876. The quantity of water used for extinguishing fires during 1877 was rather more than 14½ million gallons, or about 65,400 tons; about one-half of this quantity was taken from the river, canals, and docks, and the remainder from the street pipes. During the year there were nine cases of short supply of water, 33 of late attendance of turncocks, and 9 of no such attendance, making 51 cases in which the water arrangements were unsatisfactory, against 32 and 40 in the two preceding years.

REFORMATORY AND INDUSTRIAL SCHOOLS.—A Blue-book has been printed giving the annual report for the year which ended the 31st of December, 1877, of the Inspector, Mr. William Inglis, appointed to visit the certified reformatory and industrial schools of Great Britain. The inspector states that with respect to industrial schools the number of children detained in them is so steadily and rapidly increasing, entailing a corresponding increase in the estimates, that it is plain the time must soon come, if it has not already arrived, when something must be done to keep the demands on the Treasury within reasonable limits. Many children are now sent to industrial schools who should be remitted to the care of the Poor Law authorities, and certainly should be cared for at the expense of the rates and not of the Treasury. In Scotland the Treasury is partially recouped for the cost of the maintenance of such children, the parochial Board being liable to contribute towards their support if the child has in its own person or through its parents been chargeable to the parish within three months preceding its being sent to the school. Some provi-

sion of the sort might, in the inspector's opinion, be very properly extended to England. To show how the numbers have increased and are rapidly increasing, it may be mentioned that in 1861 the number of certified industrial schools was 34, the number of children, being boys, 297; girls, 183; in 1877 there were 124 schools, with 11,315 boys and 3,044 girls. The educational condition of the schools is, Mr. Inglis says, fairly satisfactory. The endeavour is to make the children write a legible hand, read well, and understand what they read, work correctly in the simpler rules of arithmetic as far as proportion and practice, and write well from dictation. In addition to this, the elements of geography, history, and grammar are taught in some schools, and in some free-hand drawing has been introduced. He thinks, however, that something might be gained by insisting on more uniformity in the teaching. In most schools tailoring and shoemaking are taught, with wood-chopping or match-box making for the younger children. Some of the most successful schools are the purely agricultural ones, and the report states that undoubtedly some of the best work is done in the training ships. The instruction is thoroughly practical, tending in every way to make a boy fit for a sailor's life. It is to be regretted that, owing to various circumstances, so few boys find their way into the Royal Navy; a large percentage go to sea, but not so many as we have a right to expect. This is principally owing to the action of the parents, who in many cases endeavour to dissuade their children from going to sea. As the boys have been specially educated with this view, and with the concurrence of the parents generally in the first instance, at an expense to the country of 6*s.* a week, Mr. Inglis thinks something should be done to render the boys more independent of their parents' wishes. At the age at which a boy is dismissed from a training ship he ought at least to be allowed to choose for himself. The number of reformatory schools at present is 54 in England, and 12 in Scotland. The number under detention on December 31, 1877, was, boys, 5,621; girls, 1,232. These numbers show an increase in the year of 219 boys and 20 girls. The discharges from reformatory schools in 1877, deducting transfers, amounted to 1,638—boys, 1,310; girls, 328. The numbers for 1876 were, boys, 1,268; girls, 298; total 1,566. The discharged were disposed of as follows:—To employment or service, boys, 503; girls, 197. Placed out through relatives, boys, 459; girls, 98. Emigrated, boys, 26; girls, 2. Sent to sea, boys, 210. Enlist d, boys, 29. Discharged from disease, boys, 14; girls, 8. Discharged as incorrigible, boys, 3; girls, 2. Died, boys, 32; girls, 12. Absconded not recovered, boys, 34; girls, 9. As compared with 1876, the emigrated were less by 17, those sent to sea more by 42; the deaths were less by 13. The average cost for maintenance, including rent and expenses on disposal, and allowing the usual set-off for the profits of the labour of the inmates, was:—For boys' reformatories in England, 21*l.* 2*s.* 6*d.*, and in Scotland, 21*l.* 10*s.* 9*d.* For girls' reformatories in England, 22*l.* 6*s.* 8*d.*, and in Scotland, 16*l.* 14*s.* 4*d.* In 1876 the average cost was:—For boys' reformatories in England, 18*l.* 19*s.* 11*d.*, and in Scotland, 17*l.* 8*s.* 3*d.* For girls' reformatories in England, 19*l.* 3*s.*, and in Scotland, 13*l.* 14*s.* 10*d.* The discharges from industrial schools in 1877 were:—Boys, 2,193; girls, 657; total 2,850; showing an increase of 109 boys and 71 girls. They were distributed as follows:—To employment or service, boys, 888; girls, 436. Placed out through friends, boys, 622; girls, 136. Emigrated, boys, 19; girls, 5. Sent to sea, boys, 373. Enlisted, boys, 67. Discharged as diseased, boys, 30; girls, 14. Committed to reformatories, boys, 47; girls, 17. Died, boys, 92; girls, 42. Absconded, not recovered, boys, 55; girls, 7.

Railway Accidents in 1877.—The following is a summary of the accidents and casualties which have been reported to the Board of Trade as having occurred upon the railways in the United Kingdom during the year 1877. Accidents to trains, rolling-stock, permanent way, &c., during the year 1877, caused the deaths of 35 persons, and injury to 822. Of those killed, 11 were passengers, 22 servants of companies, and 2 other persons; and of the injured, 664 were passengers, 154 servants of companies, and 4 other persons. In the course of the year there were reported to the Board of Trade 45 collisions between passenger trains or parts of passenger trains, causing the deaths of 2 servants and injury to 169 passengers and 11 servants; 110 collisions between passenger trains and goods or mineral trains, engines, &c., by which 3 passengers and 1 servant were killed, and 286 passengers, 51 servants, and a man who was riding unknown to the company's servants in a train of empty carriages, were injured; 27 collisions between goods trains or parts of goods trains, causing the death of 2 passengers (men in charge of cattle) and 6 servants, and injury to 4 passengers and 29 servants; 92 cases of passenger trains or parts of passenger trains leaving the rails, by which 5 passengers and 2 servants were killed, and 104 passengers and 12 servants injured; 25 cases of goods trains or parts of goods trains, engines, &c., leaving the rails, by which 1 servant was killed and 7 were injured; 19 cases of trains or engines travelling in the wrong direction through points, causing the death of 1 passenger and injury to 25 passengers and 11 servants; 27 cases of trains running into stations or sidings at too high a speed, by which 1 servant was killed and 48 passen-

gers and 9 servants injured; 173 cases of trains running over cattle or other obstructions on the line, by which 2 servants and a platelayer's wife who was riding upon a trolley was injured; 50 cases of trains running through gates at level crossings, by which a man who was attending to some gates, instead of the proper gatekeeper, was killed, and 2 servants were injured; 4 cases of the bursting of boilers or tubes, &c., of engines, by which 2 servants were killed and 2 injured; 14 cases of the failure of machinery, springs, &c., of engines, by which 1 passenger and 2 servants were injured; 548 failures of axles, causing injury to 9 passengers and 1 servant; 2 cases of the failure of brake apparatus, resulting in injury to 1 passenger; 14 failures of couplings, causing the death of 1 servant and injury to 10 passengers and 3 servants; 7 failures of tunnels, bridges, viaducts, culverts, &c., causing the death of 3 servants and injury to 4, and also injury to 2 men who were in charge of a road locomotive; 34 cases of the permanent way having been damaged by floods, causing injury to 2 servants; 19 slips in cuttings or embankments, resulting in the death of 2 servants and injury to 6; and 17 miscellaneous accidents, by which 1 passenger and 1 servant were killed and 7 passengers injured. There were also reported 918 failures of tyres, 37 failures of wheels, 3 failures of ropes used in working inclines, the fracture of 395 rails, 10 cases of fires in trains, and 4 cases of fires at stations; but in none of these was any personal injury involved. By accidents to passengers from causes other than accidents to trains, rolling-stock, permanent way, &c., including accidents from their own want of caution or misconduct, accidents to persons passing over level crossings, trespassers, and others, 522 persons were killed and 878 injured, 115 of the killed and 619 of the injured being passengers. Of these, 50 were killed and 87 injured by falling between carriages and platforms; 13 were killed and 413 injured by falling on to platforms, ballast, &c., when getting into or alighting from trains; 37 were killed and 19 injured whilst passing over the line at stations; 39 were injured by the closing of carriage doors; 8 were killed and 29 injured by falling out of carriages during the travelling of trains; and 7 were killed and 32 injured from other causes; 68 persons were killed and 33 injured whilst passing over the line at level crossings, viz., 59 killed and 26 injured at public level crossings, 6 killed and 2 injured at occupation crossings, and 3 killed and injured at foot crossings; 254 persons were killed and 141 injured when trespassing on the railways; 41 persons committed suicide on railways; and of other persons not specifically classed, but mostly private people having business on the companies' premises, 44 were killed and 85 injured. During the year there were 620 servants of companies or contractors reported as having been killed, 2,009 injured, in addition to those mentioned above. Of these, 44 were killed and 351 injured, whilst coupling or uncoupling vehicles; 7 were killed and 56 injured by coming in contact whilst riding on vehicles during shunting, with other vehicles, &c., standing on adjacent lines; 1 was killed and 76 were injured whilst passing over or standing upon buffers during shunting; 39 were killed and 223 injured in getting on or off, or by falling off, engines, waggons, &c., during shunting; 10 were killed and 118 were injured whilst braking, spragging, or chocking wheels; 32 were killed and 73 were injured whilst attending to ground points, marshalling trains, &c.; 7 were killed and 100 injured whilst moving vehicles by capstans, turntables, props, &c., during shunting; and 27 were killed and 169 injured by various other accidents during shunting operations; 21 were killed and 62 injured by falling off engines, &c., during the travelling of trains; 9 were killed and 34 injured by coming in contact with over-bridges or erections on the sides of the line during the travelling of trains; 22 were killed and 84 injured whilst getting on or off engines, vans, &c., during the travelling of trains; 5 were killed and 70 injured whilst attending to, or by the failure of, machinery, &c., of engines in steam; 129 were killed and 147 injured whilst working on the permanent way, sidings, &c.; 14 were killed and 3 injured whilst attending to gates at level crossings; 154 were killed and 162 injured whilst walking, crossing, or standing on the line on duty; 37 were killed and 138 injured by being caught between vehicles; 26 were killed and 63 injured by falling or being caught between trains and platforms; 30 were killed and 13 injured whilst walking, &c., on the line on the way home or to work; and 6 were killed and 58 injured from various other causes. Altogether, there were 1,175 persons killed and 3,705 injured on railways in the United Kingdom in the course of public traffic, during the year 1877, as reported to the Board of Trade. In addition to the above, the railway companies have reported to the Board of Trade, in pursuance of the 6th section of the Regulation of Railways Act, 1871, the following accidents which occurred upon their premises, but in which the movement of vehicles used exclusively upon railways was not concerned, namely:—6 passengers killed and 76 injured whilst ascending or descending steps at stations; 30 injured by being struck by barrows, falling over packages, &c., on station platforms; 34 injured by falling off platforms; and 22 injured from other causes. Of servants of companies or contractors, 6 were killed and 462 injured, whilst loading, unloading, or sheeting waggons; 1 was killed and 137 injured, whilst moving or

carrying goods in warehouses, &c.; 4 were killed and 131 injured whilst working at cranes or capstans; 4 were killed and 188 injured by the falling of waggon doors, lamps, bales of goods, &c.; 6 were killed and 259 injured by falling off, or when getting on or off, stationary engines or vehicles; 12 were killed and 131 injured by falling off platforms, ladders, scaffolds, &c.; 2 were killed and 163 injured by stumbling whilst walking on the line or platforms; 35 were injured whilst attending to stationary engines in sheds; 39 were injured by being trampled on or kicked by horses; 4 were killed and 146 injured whilst working on the line or in sidings; and 3 were killed and 130 injured from various other causes; 4 persons who were transacting business on the companies' premises were killed and 55 injured, making a total in this class of accidents of 52 persons killed and 2,008 injured. Thus the total numbers of personal accidents reported to the Board of Trade by the several railway companies during the year 1877 amount 1,227 persons killed and 5,713 injured.

Railway Accidents, January to June, 1878.—The Board of Trade has published a return of the railway accidents in the United Kingdom, reported to them during the six months. The total number of persons killed on railways in the course of public traffic was 471, and the number injured 1,558. Accidents to trains, rolling stock, &c., caused the death of 3 persons and injury to 287. One passenger was killed and 217 injured; and 2 railway servants were killed and 70 injured. Accidents from causes other than accidents to trains, rolling stock, permanent way, caused the death of 214 persons and injury to 373. Of these, 38 of the killed and 250 of the injured were passengers. Of the latter, 22 were killed and 41 injured by falling between carriages and platforms; 2 were killed and 167 injured by falling on to platforms, ballast, &c., when getting into or alighting from trains; 11 were killed and 10 injured while passing over the line at stations, 20 were injured by the closing of carriage doors, 1 was killed and 8 were injured by falling out of carriages during the travelling of trains, and 2 were killed and 14 injured from other causes. 24 persons were killed and 7 injured while passing over the line at level crossings—namely, 18 killed and 7 injured at public level-crossings, 2 killed at occupation-crossings, and 4 killed at foot-crossings. 101 persons were killed and 63 injured when trespassing on the railways. 32 persons committed suicide on railways. And of other persons not specifically classed, but mostly private people having business on the companies' premises, 19 were killed and 43 injured. Under the head of "accidents to servants in the employ of railway companies or contractors, caused by the travelling of trains or the movement of vehicles used exclusively upon railways," it is stated that, during the six months, there were 254 servants of companies or contractors reported as having been killed and 898 injured, in addition to those included in the first class. In addition to these, the railway companies have reported to the Board of Trade, in pursuance of the 6th section of the Regulation of Railways Act, 1871, the following accidents which occurred upon their premises, but in which the movement of vehicles used exclusively upon railways was not concerned, namely:—1 passenger killed and 39 injured whilst ascending or descending steps at stations; 13 injured by being struck by barrows, falling of packages, &c., on station platforms; 15 injured by falling off platforms; and 12 injured from other causes. Of servants of companies or contractors, 2 were killed and 184 injured whilst loading, unloading, or sheeting waggons; 64 were injured while moving or carrying goods in warehouses, &c.; 2 were killed and 35 injured while working at cranes or capstans; 3 were killed and 68 injured by the falling of waggon doors, lamps, bales of goods, &c.; 1 was killed and 162 were injured by falling off, or when getting on or off, stationary engines or vehicles; 6 were killed and 59 injured by falling off platforms, ladders, scaffolds, &c.; 73 were injured by stumbling whilst walking on the line or platform; 18 were injured while attending to stationary engines in sheds; 2 were killed and 21 injured by being trampled on or killed by horses; 3 were killed and 86 injured while working on the line or in sidings; and 1 was killed and 64 injured from various other causes; 8 persons who were transacting business on the companies' premises were killed and 36 injured, making a total, in this class of accidents, of 29 persons killed and 949 injured. Thus, the total numbers of personal accidents reported to the Board of Trade by the several railway companies during the six months amount to 500 persons killed and 2,507 injured.

Detective Police.—The work of the detective department of the Metropolitan Police in the year 1877 is described as having comprised 295 inquiries respecting forgeries, burglaries, and larcenies in the metropolis, 179 inquiries respecting offences committed out of the metropolis, and miscellaneous inquiries for county and borough police, 317 inquiries of a varied nature for Government departments, 245 miscellaneous inquiries for foreign Governments and police, 39 inquiries respecting missing persons, 17 inquiries respecting insane persons, 14 inquiries respecting cases of murder or death in suspicious circumstances, 4 inquiries respecting incendiary fires, 216 inquiries not included under the above heads, 57 attendances at races and

on other public occasions. These items make 1,383 matters in all.

METROPOLITAN POLICE.—Colonel Sir Edmund Henderson's report to the Home Secretary upon the metropolitan police shows that the total strength of the force on the 31st of December, 1877, was 10,446, consisting of 25 superintendents, 279 inspectors, 1,078 sergeants, and 9,064 constables, showing an increase over the preceding year of 2 inspectors, 25 sergeants, and 151 constables. The total number of persons apprehended by the police during the year was 77,982, of whom 2,571 were convicted on committal for trial, and 863 acquitted; 54,034 were summarily convicted, and 20,514 were discharged by magistrates. The number of apprehensions shows a considerable increase over the preceding years since 1872. The year was marked by the prevalence for a time of robberies of various kinds, partly accounted for, Sir E. Henderson thinks, by the depression of trade, and partly the result of the depredations committed by a limited number of thieves, who confined their operations mostly to houses left empty and unattended. Out of 1,253 cases of burglary, housebreaking, and breaking into shops and warehouses, no fewer than 839 were houses empty or with no person in charge; 203 of these cases occurred in the Islington division. Special arangements were made to meet this outbreak of crime, and many of the principal offenders have been arrested and convicted. 25,259 doors and windows were found by the police open or insecurely fastened at night. The increase in the number of arrests is due entirely, the report says, to the increase of crime; for the number of persons arrested for being drunk and disorderly, or simply drunk, was almost exactly the same as in the previous year. On the other hand, the arrests for the following serious offences in 1877 were considerably in excess of those for 1876:—1876.—Assaults, 6,964; burglary, 92; housebreaking, 70; larcenies, 9,400; suspicious persons, 1,276; vagrants, 3,830. 1877—Assaults, 7,198; burglary, 127; housebreaking, 152; larcenies, 9,760; suspicious persons, 1,437; vagrants, 4,101. The total amount of indictable offences committed in 1877 was 15,409, against 13,900 in the preceding year, and the arrests increased from 4,234 to 4,534, and the convictions from 2,476 to 2,571. The conduct of the police during the year, leaving out the detective department, to which a special paragraph is devoted, is reported to have been very good. The number dismissed was only 167, and those compelled to resign were 136, being the smallest number of serious disciplinary charges during the last ten years. The number of voluntary resignations also decreased to 263, and the total removals out of an authorised strength of 10,446 were 960, being 9·19 per cent., the smallest percentage for many years. 15 constables were charged before a magistrate, of whom 3 were discharged, 3 were convicted of simple larceny, 1 for desertion from the army, 4 for assault, 1 for violation of duty, and 3 for unlawfully absenting themselves from duty. 100 police officers were commended by judges and magistrates, and 748 were commended and rewarded by the Commissioner. The assaults on the police decreased from 2,941 in 1876 to 2,849 in 1877.

ACCIDENTS IN MINES.—According to the reports of the inspectors of mines, there were 1,208 deaths in 1877 from accidents in mines in Great Britain classed under the "Coal Mines Registration Act"—in other words, there was one death by accident for every 123,217 tons of minerals raised. This, though a more unsatisfactory return than that for the previous year, is more favourable than in recent years, the proportion to tons being in 1869 as heavy as one to 96,777 tons. Out of the gross total of 1,208 lives lost during last year, the various mineral-producing districts contributed in the following proportions:—East Scotland, 283; Yorkshire, 128; West Lancashire and North Wales, 127; South Wales, 122; South Durham, 95: North and East Lancashire, 92; South Staffordshire and Worcestershire, 80; Northumberland and North Durham, 66; Derby, Nottingham, Leicester, and Warwick, 58; Monmouth, Gloucester, Somerset, and Devonshire, 55; West Scotland, 56; North Staffordshire, Cheshire, and Shropshire, 45; Ireland, 1. The causes of the fatalities are varied:—345 lives were lost by explosions or firedamp—212 in East Scotland; 135 persons were killed by falls of side in mines, and 313 by falls of roof. Yorkshire occupying the most unfavourable position in this respect. In the mine shafts 129 persons were killed, the cause being overwinding in four instances and ropes and chains breaking in four more, while 15 persons died by falling into the shaft from the surface; miscellaneous underground accidents caused the loss of 187 lives, 14 being by explosions of gunpowder, and there being 15 cases of suffocation by gases; 9 deaths being also due to irruptions of water, and an equal number to machinery accidents underground. The fatal accidents on the surface involved the loss of 99 lives—17 by machinery, 6 by boilers bursting, and 76 by miscellaneous causes. As the mere statement of the number of deaths in the various districts conveys only an inadequate idea of the comparative fatality of the year, it may be said that in proportion to the output, one life was lost in the South Durham coal district to each 208,944 tons raised; in the Cleveland iron district, one to each 299,896 tons raised; while the proportion was, in the West Lancashire and North Wales district, one life to 90,723 tons; and in the South Wales district, one to 117,714 tons.

THIRTY YEARS OF FATAL SHIPWRECKS.—The annals of maritime disasters during the past thirty years fail to show any catastrophe entailing such a lamentable loss of life as that which has marked the sinking of the "Princess Alice" by the "Bywell Castle." Setting aside the loss of the "Grosser Kurfürst," the most fatal accident of a like character that has taken place off our own coasts during the period in question was the running down of the "Northfleet" emigrant ship while at anchor off Dungeness on the night of January 22, 1873, by the Spanish steamer "Murillo," when 293 persons were drowned. A collision almost equally disastrous, and strongly recalling in some respects that which has just occurred on the Thames, took place on Lake Michigan, on September 7, 1863. The steamboat "Lady Elgin," which had started from Chicago on a pleasure trip with nearly 400 excursionists on board, was run into by a schooner and sank within a quarter of an hour with 285 people, among them Mr. Herbert Ingram, the member for Boston. The year 1854 was marked by a series of fatal collisions. The Italian mail steamer "Ercolano" left Genoa on April 24 with a number of passengers, including several English, French, and Italian families, and at midnight was cut down to the water's edge by the "Sicilia." Only fourteen of the passengers escaped, amongst them being Sir Robert Peel, whose secretary and Mr. Charles Halsey, the member for Hertfordshire, were among the drowned. On April 28, the emigrant barque "Favourite," from Bremen, was run into off the Start by the "Hesper," and went down like a stone with 201 of her passengers and crew; six of the crew only saving themselves by clambering over the "Hesper's" bows. On September 27, the "Arctic," a splendid ship of the Collins Line, came into collision with the screw steamer "Vesta" in a fog off the banks of Newfoundland; and out of the 368 persons on board 323 perished, among them the Duc de Gramont and the Duc de Guynes. The same year was also memorable in maritime disaster by the disappearance of the "City of Glasgow,' screw steamer, which left the Mersey for Philadelphia on March 1, with 480 persons on board, all told, and of the "Lady Nugent," transport, which sailed from Madras on May 10 with reinforcements for the army at Rangoon, forming with her crew a total of some 400 persons. Neither of these vessels was ever heard of again—a fate shared by the "Pacific," which left Liverpool on January 23, 1856, with 106, and the "City of Boston," which sailed from Halifax on January 28, 1870, with 191 persons on board. The mail steamship "Europa," on her way to England in July, 1849, ran down the emigrant barque "Charles Bartlett," causing the deaths of 132 persons; and the Irish steamer "Mangerton" blundered into the New Zealand clipper "Josephine Willis," just off the South Foreland, and sent her and 69 people, mostly passengers, to the bottom. The foundering of the "Captain" off Cape Finisterre on the night of September, 1870, with Captain Burgoyne and 500 officers and seamen, remains the heaviest calamity that has befallen the navy during the latter half of the present century. The severest loss suffered at sea by the army was from the contingent furnished by the 12th Lancers and 43rd and 92nd Foot towards the 438 lives lost with the "Birkenhead" off the Cape of Good Hope, on February 26, 1852. The American army sustained an almost equal loss, when about 300 of the troops on board the "San Francisco" were washed overboard, or died from exhaustion and exposure during her passage from California in December, 1853. The most disastrous conflagration in British waters was that which caused the deaths of 178 people on board the emigrant packet "Ocean Monarch" in Abergele Bay on the afternoon of August 24, 1848. But its horrors were even eclipsed by those attending the burning of the steamship "Austria" between Hamburg and New York on September 13, 1858, when 461 out of the 528 persons on board were burned or drowned. A like fate overtook 204 of the 338 persons on board the "Golden Gate" on her passage from San Francisco to Panama on the 27th of July, 1862; while the number who perished in a similar manner, with Eliot Warburton, on board the "Amazon" in the Bay of Biscay on the 4th of January, 1852, amounted to 102 out of 161 persons. The author of "The Crescent and the Cross" had written that "since the days of steam navigation the Bay of Biscay was no longer formidable;' yet the "London" steamship went down in it on her way to Australia on the 11th of January, 1866, carrying with her 239 out of her complement of 258, and among them G. V. Brooke, the actor. Two most disastrous shipwrecks of recent date were those of the "Atlantic" and the "Royal Charter." The latter, a homeward-bound Australian clipper, was crushed like an eggshell on the rocky coast of Anglesea just before daybreak on October 26, 1859, and 459 men, women, and children were drowned, some forty or so managing to scramble ashore. The number of lives lost with the "Atlantic," one of the White Star Line, was even more appalling. She struck on a sunken rock off the coast of Nova Scotia, on April 1st, 1873, with 931 persons on board, and the breakers swept away 481 of them. The "Anna Jane," of Liverpool, bound for Canada, with 460 emigrants and a crew of 45, was driven on shore on Barra Island, one of the Hebrides, on September 29, 1853, and 393 persons perished. The "Pomona," another emigrant ship from the same port, was suffered, through an error in her reckoning, to run on the Wexford coast during

the night of April 28, 1859, the result being the loss of 386 lives. In 1854 the "Tayleur," another Liverpool emigrant ship, ran on to Lambay Island, near Howth, on January 21, when 290 lives were lost; and a similar fate overtook the "Powhattan," from Havre, on the coast of Barnegat, on April 15, not a soul out of the 250 on board of her escaping. In the terrible gale of April 30, 1850, the "Royal Adelaide" steam-packet, from Cork to London, went on to the Tongue Sands, near Margate, and of the 260 persons forming her passengers and crew not one survived to give the details of her fate. Among the ships lost during the storm of February 28, 1849, was the German emigrant barque "Floridian," which was driven on the Long Sands and went to pieces, 174 people perishing, and 4 being rescued by a revenue cutter. During the night of May 3, 1855, the emigrant ship "John," proceeding down Channel, ran on to the Manacle Rocks, and 170 of those on board were drowned. The island of Innistrahull, on the north coast of Ireland, proved in like manner destructive to the magnificent new screw "Cambria," on her return from New York, on October 19, 1870, one seaman alone surviving to relate the fate of the 170 persons on board her.

PAUPERISM.—A return has been issued giving the number of paupers of all classes (except lunatic paupers in asylums and vagrants) in receipt of relief on the last day of each week in the months of June, 1877 and 1878, respectively. In the first week of June, 1877, the numbers were 664,909, and in the corresponding week of 1878, 683,546, an increase of 18,637, or a difference of 2·8 per cent. In the second week the numbers were, in 1877, 662,750, and in 1878, 680,721, an increase of 17,971, or a difference of 2·7 per cent. In the third week the numbers were 659,898 and 678,813, being an increase for 1878 of 18,915, or a difference of 2·9 per cent. In the fourth week the numbers were 655,726, and 674,798, or an increase of 19,072 for 1878, the difference per cent. being 2·9. A Parliamentary return showing the number of Scotch paupers in Ireland and of Irish paupers in Scotland, which was ordered to be printed in July last, on the motion of Mr. Mark Stewart, has just been issued. It appears that on the 6th of January, 1877, the number of paupers, including children, who were receiving relief in Irish workhouses and who were born in Scotland, was 68. On the 7th of July, 1877, the number of such paupers had increased to 75. On both those dates there was only one native of Scotland who was receiving out-door relief in Ireland. Five natives of Scotland were receiving relief in Ireland by being detained in lunatic asylums, on the 2nd of January, 1877; and six were obtaining such relief on the 3rd of July in the same year. The number of paupers, including children, born in Ireland, and the dependents of such paupers, who were receiving relief in Scotland, on the 31st of December, 1876, is given as follows:—Paupers, 1,511, dependents of such paupers, 217; paupers detained in lunatic asylums, 564. On the 30th of June, 1877, the numbers were:—Paupers, 1,381; dependents of such paupers, 256; paupers detained in lunatic asylums, 564.

PAUPERISM IN SCOTLAND.—The number of registered paupers and their dependents in Scotland last year in the 886 parishes into which the country is divided, was 96,404, composed of 62,058 paupers and 34,346 dependents. These figures show a considerable reduction on the year 1863, the first period taken into account in the tables in the Statistical Abstract—when the total was 120,284, made up of 78,717 paupers and 41,567 dependents. From the year 1863 the figures varied but little until 1868, when the total rose to 128,976, but in 1872 it had again fallen below 120,000, standing at 111,996, and since that time it has fallen year by year. The total for 1877 shows a reduction of 2,193 on that of 1876.

PAUPERISM IN IRELAND.—The statistics of Irish pauperism classify the recipients of relief under indoor and outdoor paupers with a third class for those who are in blind and deaf and dumb asylums and extern hospitals. The total number in the first week of January in 1877 was 85,530, as compared with 66,228 in 1863, the first year brought under account. Of these, 49,365 were indoor paupers, of whom 7,382 were able-bodied adults; 35,500 were in receipt of outdoor relief, and 665 were in asylums or hospitals. The total for the year, although showing a satisfactory reduction on the returns of fifteen years ago, shows a considerable increase in the year 1876, the figures being 85,530 for 1877 as against 78,528 for 1876.

ANNUAL MEAN OF PAUPERISM. — The highest number of paupers since the cotton famine was in 1870–71, when the indoor paupers numbered 156,430, and the outdoor to 880,930, forming a total of 1,037,360, or 46 per 1,000 of population. In 1876–77, the last parochial year for which the returns are complete, the indoor paupers numbered 149,611, and the outdoor 570,338, the total being 719,949, or 29 per 1,000 of population. Hence in five years there has been a total decrease of 317,411, or more than 30 per cent.

ILLICIT DISTILLATION.—The Commissioners of Inland Revenue report that the number of detections in the year ended 31st March, 1876, was, in England, 8; in Scotland, 1; and in Ireland, 796. In the year 1877, the numbers were, in England, 3; in Scotland, 2; in Ireland, 979. In 1874–5, there were only 731 detections in

Ireland, the smallest number on record, but this satisfactory result has not been maintained. The following year a slight increase occurred, and in the past year the increase has been very considerable indeed. During the same period the detections made by the Inland Revenue Officers of illicit spirits in the stocks of publicans have also increased. It is evident, therefore, that in certain districts there has been a strong tendency to revive the pernicious practice of illicit distillation. The evil is very much restricted compared to what it was a few years ago. The condition of England and Scotland, as regards freedom from illicit distillation, is highly satisfactory.

6. EDUCATION, SCIENCE, AND ART.

PROGRESS OF EDUCATION IN GREAT BRITAIN.—The following table exhibits the progress of education in Great Britain in schools under Government inspection from 1859 to 1877, distinguishing England and Wales from Scotland:—

Years ended 31st August.	Number of Schools Inspected.	Number of Children who can be Accommodated.	Average number of Children in Attendance.	Number of Children present at Inspection.
	ENGLAND and WALES (including ISLE OF MAN and ROMAN CATHOLIC SCHOOLS for GREAT BRITAIN).			
1859	5,531	1,054,813	674,602	757,082
1864	6,470	1,332,553	862,817	983,928
1869	8,592	1,838,416	1,153,572	1,448,299
1874	13,084	2,952,479	1,710,806	2,093,180
1876	14,875	3,483,789	2,007,732	2,448,299
1877	15,187	3,653,418	2,150,683	2,633,198
	SCOTLAND (exclusive of ROMAN CATHOLIC SCHOOLS, included above).			
1859	1,055	154,228	126,799	123,049
1864	1,421	188,904	148,317	149,363
1869	1,745	237,928	179,214	191,203
1874	2,587	391,592	274,588	314,576
1876	2,912	462,986	332.545	382,224
1877	2,931	535,949	360,413	417,699
	TOTAL FOR GREAT BRITAIN.			
1859	6,586	1,209,041	801,401	880,131
1864	7,891	1,521,457	1,011,134	1,133,291
1869	10,337	2,076,344	1,332,786	1,639,502
1874	15,671	3,344,071	1,985,394	2,407,756
1876	17,787	3,946,775	2,340,227	2,830,523
1877	18,118	4,189,367	2,511,096	3,050,897

SCHOOL ACCOMMODATION IN ENGLAND AND WALES.—A table of statistics given in the Report of the Committee of Council shows that the schools in England and Wales visited by the inspectors for the purpose of annual grants, which provided in 1869 for 1,765,944 scholars, or for 8·34 per cent. of the population, were in 1877 sufficient for 3,653,418 scholars, or 14·88 per cent. of the estimated population. An additional provision of room in aided schools for 1,887,474 children has thus been made in eight years, so that accommodation in efficient schools is increasing in a much more rapid ratio than the population of the country. In 1877 accommodation was provided by 2,082 Board Schools for 705,122 scholars, and 427,533 were in average attendance. The increase in the accommodation in Voluntary Schools, since 1869, has, therefore, amounted to 1,182,352 places (or 66·95 per cent.), while the average attendance has increased by 660,151 (or 62·1 per cent.). During the last six years (1871 to middle of year 1877) the population between the ages of 3 and 15 has increased 498,000. or 7·9 per cent.; during the same period additional accommodation has been provided in efficient public elementary day schools for 1,640,739 scholars, being an increase of 81 per cent.

ANNUAL PARLIAMENTARY GRANTS FOR EDUCATION IN ENGLAND FROM 1833 TO 1878.

1833—1838	£20,000	1862 . .	£842,119
1839—1841	30,000	1863 . .	804,002
1842—1844	40,000	1864 . .	705,404
1845 . .	75,000	1865 . .	693,078
1846—1850	115,000	1866 . .	694,530
1851 . .	150,000	1867 . .	705,865
1852 . .	160,000	1868 . .	781,324
1853 . .	260,000	1869 . .	840,711
1854 . .	263,000	1870 . .	914,721
1855 . .	396,921	1871 . .	1,458,402
1856 . .	451,213	1872 . .	1,551,560
1857 . .	541,233	1873 . .	1,299,803
1858 . .	663,435	1874 . .	1,356,852
1859 . .	836,920	1875 . .	1,548,563
1860 . .	798,167	1876 . .	1,707,055
1861 . .	803,794	1877 . .	1,910,000
1878 . . .	2,149,208		

THE SCIENCE AND ART DEPARTMENT.—The twenty-fifth report of the Science and Art Department shows that the number of schools examined in 1877 was 1,348, and was smaller than that examined in 1876. This decrease was entirely due to the withdrawal of physical geography from the list of subjects for which aid is given, for in the remaining subjects there has been a substantial increase. The subject added to the list when physical geography was withdrawn—viz., physiography—has already secured a large amount of attention; and it is probable that no fewer than 5,000 candidates will present themselves for examination in it in May next. The number of papers passed compares favourably with the statistics of previous years. The number of candidates who came up in honours was 1,029, of whom 85 passed in the first class and 192 in the second class. The total number of students examined in 1876 was 33,289. It will thus be seen that, although there was a slight falling off in the number of schools and classes, there was an absolute increase in the number of students presented for examination. The distribution of schools was as follows:—1,079 in England and Wales, 114 in Scotland, and 155 in Ireland. From the reports on the general character of the examinations which have been received from the examiners it appears that the results of the examinations are generally of an encouraging nature. The total amount paid to teachers on results was for the year 1877, 41,462*l.* 3*s.* 8*d.*, being at the rate of 14*s.* 10*d.* for each person under instruction. In the previous year the rate was 14*s.* 8*d.* The payments to each teacher averaged about 26*l.* 10*s.*, and the number of teachers paid was 1,565. The report of the registrar of the Royal School of Mines shows that the number of Royal exhibitioners and students who entered the school with the view of becoming associates was 38. The number in the previous year was 31. There were also 181 students who entered for the special courses of instruction. During the year 1876-77, 41 students in training to become art teachers, and 14 national scholars in training to become designers or art workmen, received allowances to enable them to study in the National Art Training School and Museums; 20 students were admitted on payment of half fees; and 98 others, including the students in training, the national scholars, and 17 men of the Corps of Royal Engineers, received gratuitous instruction. New schools of art have been established during the year 1877 at Barnstaple, Doncaster, Keswick, and Weymouth. The total number of schools of art in operation throughout the kingdom was 144. The total number of students in these schools was 29,414. The annual increase reported in previous years in the work done in these schools and their branches continues to be maintained. The amount of fees paid by students in schools of art in the last three years shows a considerable increase each year, as follows: 1875, 30,338*l.*; 1876, 32,933*l.*; 1877, 35,346*l.* In 3,767 elementary schools 549,010 children were taught drawing, and 403,208 were examined at the annual examination in March, 1877. These numbers, compared with those of 1876, present an increase of 432 schools, 88,049 children taught, and 71,860 examined. The total amount of the grants in aid of instruction in drawing in elementary schools in 1877 was 27,965*l.* 4*s.* 5*d.*, showing an increase of 5,901*l.* 6*s.* 11*d.* on the amount granted in 1876—namely, 22,063*l.* 17*s.* 6*d.*

The total number of persons who received direct instruction as students, or by means of lectures, in connection with the Science and Art Department, in 1877, is 681,367, showing an increase, as compared with the number in the previous year, of 81,199, or more than 13½ per cent. The attendance at the art and educational libraries at South Kensington continues to increase; with that at the library of the Royal Dublin Society the number of readers in 1877 has been 74,333. The museums and collections under the superintendence of the department in London, Dublin, and Edinburgh, were last year visited by 2,548,766 persons, showing a decrease of 440,281 on the number of 1876. The returns received of the number of visitors at the local art and industrial exhibitions, to which objects were contributed from the South Kensington Museum, show an attendance of 1,031,506. The total number of persons who, during the year 1877, attended the different institutions and exhibitions in connection with the department has been upwards of 4,261,639. This total, compared with that of the previous year, presents a decrease of 315,738. The expenditure of the department during the financial year 1877-78, exclusive of the vote for the Geological Survey, amounted to 276,416*l.* 5*s.* 4*d.*

SCHOOL BOARDS.—The School Boards have availed themselves freely of the power of borrowing, on the security of the rates, given by the Acts of 1870 and 1873. Up to the 1st of April, 1878, we had recommended to the Public Works Loan Commissioners to make 3,222 loans, amounting to 9,348,318*l.* 2*s.* 10*d.*, to 1,324 School Boards, by means of which new accommodation will be furnished for some 743,364 scholars. The School Boards have also acquired a considerable number of schools, either by arrangement with private owners and managers, or, where the premises were held in trust for educational purposes, by transfers under the section of the Act of 1870 specially framed to meet such cases. About 700 schools have been transferred to School Boards under these minutes. Of these 447 were Church Schools and 10 Wesleyan, the remainder were undenominational, 167 being British Schools. We have no definite information with respect to the number of schools made over to Boards (section 19) by private managers, but many of this latter class, as well as of the schools formally transferred, had not previously been in receipt of annual grants, so that they contribute to the increased accommodation in aided schools which has been provided in the last few years.

ENGLAND AND WALES.—The Committee of Council on Education report that in the year ending August 31, 1877, their inspectors visited 15,187 day schools in England and Wales, to which annual grants were made, containing 22,033 departments under separate teachers, and furnishing accommodation, at eight square feet of superficial area per child, for 3,653,418 scholars. There were on the registers the names of 3,154,973 children, of whom 1,100,116 were infants under seven years of age, 1,929.523 were between seven and thirteen, and 125.334 were above thirteen. Of these scholars 2,633,198 were present on the day of the inspector's visit to their respective schools, while 2,150,683 were, on an average, in daily attendance throughout the year; 1,976,889, having made the requisite number of attendances, were qualified to bring grants to their schools, 540,881 (being under seven years of age) without individual examination, and 1,436,008 (above seven), on passing a satisfactory examination in reading, writing, and arithmetic; 1,335.118 were actually presented for such examination, and while 771,652 passed the prescribed test without failure in any one of the three subjects, 85 78 scholars out of every 100 examined passed in reading, 78·99 in writing, and 69·97 in arithmetic. These figures show a considerable improvement upon the returns quoted in the last report. The accommodation has increased by 227,200 school places (or 6·62 per cent.); the scholars on the registers by 211,199 (7·17 per cent.); those present at inspection by 220,987 (9·16 per cent.); and the average attendance by 166,110 (8·37 per cent.); while the number of children individually examined has increased by 192,506 (or 16·85 per cent.). The additional effort which has resulted in this improvement may be measured by the increase of voluntary contributions from 751,800*l.* (275,390 subscribers) to 786,245*l.* (282,445 subscribers); by an advance in the contributions from rates to the maintenance of Board Schools from 369,918*l.* to 447,710*l.*; and by a rise in school pence from 1,034,408*l.* to 1,138.270*l.* The annual Government grants to elementary schools also rose in the year from 1,316,863*l.* to 1,543,225*l.*, or from 13*s.* 3¼*d.* to 14*s.* 4¼*d.* per scholar in average attendance. The night schools examined during the year were 1,733 in number; 57,785 scholars above 12 years of age, were, on an average, in attendance each night; 59,603 scholars were qualified for examination by having made the required number of attendances during the night-school session. Of these 48,481 were actually examined, and out of every 100 scholars so examined 87·76 passed in reading, 69·9 in writing, and 58·84 in arithmetic. These figures show a slight advance upon those of the previous year. The inspectors found 24,841 certificated teachers at work in the aided schools which they visited, while the forty training colleges, from which the supply of such teachers is mainly recruited, were attended in 1877 by 3,027 students. The students (with a few exceptions) and 2,079 acting teachers, were examined for certificates in December, 1877. At Midsummer last 4,226 candidates were examined for admission to the 1,584 vacancies declared in the training colleges, of whom 2,985 were successful, and 1,591 are now in their first year of residence, along with 1,489 students of the second year. The average attendance in aided schools (day and night) has risen from 1,225,764 in 1870 to 2,208,468 in 1877. There were in 1877 3,154,973 names of day scholars on the registers of inspected day schools (of whom 2,633,198 were present on the day of inspection), and this is the number of children out of at least four and a half millions for whom elementary schools are required, who received more or less of efficient instruction in such schools during the past year. Of the day scholars on the registers 1,100,116 were below, and 2,054,857 above seven years of age. It appears that whereas, out of 1,335,118 scholars examined, as many as 655,435, being over ten years of age, ought to have been presented in Standards IV, VI, only 264,860 were so presented, while 390,575 were presented in standards suited for children of seven, eight, and nine years of age.

ENGLISH LITERATURE IN 1877.—From the annual summary of books issued in 1877, given in the *Publishers' Circular* for December 31, it appears that there was a slight increase in the number of books produced

in the year over that of 1876, as that year exceeded its predecessor. Thus they stand: 1875, 4,854; 1876, 4,888; 1877, 5,095. In the various classes of books, theology held its place, no less than 485 new works having been published, with new editions, as per list *b*, 252. Both in 1875 and 1876 a natural increase in educational and philological works had been noted; this has been maintained, the result being in new books and new editions 529 in 1877 as against 470 in 1876. In juvenile works 1877 gives the sum of 522 in both new books and new editions; in 1876, 419. In works of fiction the number is for 1877, 854, as against 857 in 1876. Law and jurisprudence give new books and new editions, 118. Political economy yields no less than a total of 189. In art, science, and illustrated works no less than 189 works were issued. In history and biography there was an increase, the numbers being in 1876, 347; in 1877, 373. Voyages, travels, and geographical research in 1877 show an increase, 209 having been issued. Poetry and the drama, year-books, and serials, which are classed together somewhat arbitrarily, indicate, during the first months, a decline. The numbers are 572. Medicine and surgery are, as usual, steady and sufficient, the number being 215. And, finally, belles lettres, including reprinted sermons, monographs, essays, and pamphlets (not sermons) give 588, as against 342 in 1876.

NATIONAL PORTRAIT GALLERY.—The Trustees of the National Portrait Gallery have issued their twenty-first annual report. From it we learn that seven donations have been received during the past year; these are portraits of—Francis Horner, M.P., 1778-1817, painted by Sir Henry Raeburn; Lord Chancellor Somers, 1650-1716, by Kneller; George Morley, Bishop of Winchester, 1597-1684, by E. Lutterell: R. P. Bonington, 1801-1828, a study in black chalk, heightened with red, by Mrs. Carpenter; Queen Caroline, by Lonsdale; and busts of Thackeray and the late Lord Stanhope, by J. Durham and H. H. Armstead. The purchases included—Sir Kenelm Digby, by Van Dyck, 150*l*; Edward, Lord Herbert of Cherbury, unknown artist, 15*l*.; Henry Kirke White, a small drawing in Indian ink, 5*l*.; Ralph, Lord Hopton of Stratton, d. 1652, 25*l*.; Henry VIII, painted on panel, the size of life, one of the latest portraits known, 103*l*. 14*s*.; the Duchess of Portsmouth, 1647-1734, painted by Mignard in 1682, 105*l*.; William Juxon, Bishop of London, 1582-1663, artist unknown, 30*l*.; the great Duke of Marlborough, painted after 1702 by Closterman, 31*l*. 10*s*.; Hugh Boulter, Archbishop of Armagh, 1671-1742, by Francis Bindon, an amateur, 25*l*. Among the illustrative autographs added to the collection are—a letter of Edm. Burke, to Lady Inchiquin, niece of Sir Joshua Reynolds, and letters of Wilkes, Lord Sidmouth, Sir T. N. Talfourd, Horner, Cobbett, the Duke of Wellington, and Thackeray. The whole number of visitors during 1877 is returned at 79,987.

7. EMIGRATION.

EMIGRATION.—The following table shows the number of emigrants, of British origin only, from the United Kingdom to countries out of Europe; and number of immigrants into the United Kingdom from such countries:—

Years.	Emigrants to					Immigrants.
	British North American Colonies.	United States.	Australia and New Zealand.	Other Places.	Total.	
1863 ..	9,665	130,528	50,157	2,514	192,864	Not ascertained.
1864 ..	11,371	130,165	40,073	5,472	187,081	
1865 ..	14,424	118,463	36,683	5,321	174,891	
1866 ..	9,988	131,840	23,682	4,543	170,053	
1867 ..	12,160	126,051	14,023	4,748	156,982	
1868 ..	12,332	108,490	12,332	5,033	138,187	
1869 ..	20,921	146,737	14,457	4,185	186,300	
1870 ..	27,168	153,466	16,526	5,351	202,511	49,157
1871 ..	24,954	150,788	11,695	5,314	192,751	53,827
1872 ..	24,382	161,782	15,248	9,082	210,494	70,181
1873 ..	29,045	166,730	25,137	7,433	228,345	86,416
1874 ..	20,728	113,774	52,581	10,189	197,272	118,129
1875 ..	12,306	81,193	34,750	12,426	140,675	94,228
1876 ..	9,335	54,554	32,196	13,384	109,469	93,557
1877 ..	7,720	45,481	30,138	11,856	95,195	81,848

EMIGRATION FROM IRELAND.—The Irish Registrar-General, Dr. Burke, has issued "Observations on the Emigration Statistics of Ireland for the year 1877," from which it appears that last year 41,225persons emigrated—an increase of 2,910 over 1876. It is remarkable that the largest number were from Ulster (16,723), and the next from Munster (13,602), comparatively few having left populous Leinster or sparsely-peopled Connaught. Since the date when the collection of emigration returns began in 1851, 2,543,481 persons have left Ireland not to return, the largest numbers having quitted the country in the first four years of the interval. Ulster contributed 37 per cent. of the total. Sixty-seven per cent. of the persons who left Ireland were between the ages of fifteen and thirty-five years. In recent years a striking change has occurred in the destination of emigrants; and of the 38,503 persons (natives of Ireland) who emigrated in 1877 no fewer than 20,2171 are set down as having gone to Great Britain—a larger number than to the colonies or foreign countries (18,232). Of these latter 12,018 went to the United States; of the 20,271 who left to settle in Great Britain within the year 11,573 went to England and Wales and 8,698 to Scotland; and of those who went to Scotland 86 per cent. were Ulstermen. The majority of the emigrants who went to England were from the province of Munster.

8. THE POST OFFICE.

THE LETTER POST.—The enormous growth of the letter post is shown by a table published in the Statistical Abstract of the United Kingdom, which gives the total number of letters annually delivered stated in millions from 1863 to 1878.

Years.	Number of Letters delivered in (stated in Millions).				Proportionate Number of Letters delivered per each 100 of the Population in			
	England and Wales.	Scotland.	Ireland.	United Kingdom.	England and Wales.	Scotland.	Ireland.	United Kingdom.
	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.
1863	529	61	52	642	2,569	1,951	910	2,181
1864	560	64	55	679	2,688	2,028	975	2,292
1865	597	67	56	720	2,831	2,104	1,001	2,411
1866	623	70	57	750	2,919	2,178	1,033	2,494
1867	640	76	59	775	2,962	2,343	1,076	2,555
1868	670	78	60	808	3,062	2,382	1,099	2.639
1869	683	79	62	824	3,081	2,391	1,139	2,665
1870	704	79	64	847	3,135	2,369	1,182	2,714
1871	721	80	66	867	3,168	2,376	1,225	2,751
1872	737	82	66	885	3,195	2,412	1,229	2,780
1873	756	84	67	907	3,237	2,448	1,255	2,823
1874	802	90	70	962	3,377	2,600	1,318	2,946
1875	847	91	71	1,009	3,529	2,600	1,339	3,085
1876	856	91	72	1,019	3,520	2,579	1,354	3,079
3 Months ended 31st March, 1877.	218	24	18	259	899	680	338	783
Year ended 31st March, 1878.	884	100	74	1,058	3,601	2,808	1,386	3,163

TELEGRAPHIC MESSAGES.—The number of telegraphic messages (exclusive of press, service, and news messages) forwarded from postal telegraph stations in 1877, was 17,958,330 in England and Wales; 2,457,350 in Scotland; 1,561,404 in Ireland; giving a total of 21,977,084 for the United Kingdom. This shows only a slight increase on 1876, when the total was 21,575,207, but as compared with the year 1870, when the telegraphs were transferred to the State, the increase is very large, as the

total for that year was only 8,606,732 for the United Kingdom, or less than half the number of messages sent last year in England and Wales alone.

POST CARDS AND POSTAL WRAPPERS.—The following is an account of the number of post cards and postal wrappers issued in the years ended 31st March, 1876 and 1877:—

	Year ended 31st March, 1876.	Year ended 31st March, 1877.
Thin Post Cards	74,606,539	72,807,120
Stout " "	19,550,897	23,937,084
Total.. ..	94,157,436	96,744,204
Postal Wrappers	101,220,960	105,041,916

It will be seen that there is a slight falling off in the issue of the thin cards, but that the stout card is still growing in popularity, as the issue of this year shows an increase of 4,386,187 cards, and consequently the aggregate issue of postal cards exceeds that of the previous year by 2,586,768 cards. The stout cards being so popular, provision has been made by the Commissioners of Inland Revenue for their issue in sheets, which will allow of their being printed upon. The issue of postal wrappers is still increasing, and the arrangement made with the Postmaster-General for the new issue in stouter material from the 1st December last, has brought the official wrapper into more general favour.

MONEY ORDERS.—The total number of money orders issued in the year 1877 in the United Kingdom for payment in the United Kingdom was 18,890,692, made up as follows:—In England and Wales, 16,090,373; Scotland, 1,569,064; Ireland, 1,231,255. In 1863 the total number of orders issued in the United Kingdom, including those payable abroad, was only 7,956,794, but in 1875 it had doubled, having reached 16,485,661; in 1876 it stood at 17,322,133, so that the last year's issues show an increase of 1,568,459. The value of the orders has not, of course, increased in a corresponding degree, but the total of 1877 was 28,474,607*l.* as compared with 16,493,793*l.* in 1863. The several divisions of the United Kingdom last year were represented as follows: England and Wales, 23,911,617*l.*; Scotland, 2,532,179*l.*; Ireland, 2,030,811*l.*

SAVINGS BANKS UNDER THE POST OFFICE.—The following table shows the total amount received from and paid to depositors in the Post Office Savings Banks from 1864 to 1878.

		England and Wales.	Scotland.	Ireland.	United Kingdom.
		£	£	£	£
1864..	Received*	3,242,088	82,219	121,044	3,452,351
	Paid	1,685,730	64,831	85,494	1,836,056
	Capital	4,687,893	123,747	181,484	4,993,124
1866..	Received*	4,335,449	99,798	134,583	4,569,830
	Paid	2,776,956	83,013	115,086	2,975,055
	Capital	7,719,981	164,560	236,634	8,121,175
1868..	Received*	5,247,761	120,818	237,288	5,605,867
	Paid	3,475,843	83,696	129,602	3,689,141
	Capital	11,002,147	229,676	434,832	11,666,655
1870..	Received*	5,891,508	146,429	295,145	6,333,082
	Paid	4,442,862	108,941	206,384	4,758,187
	Capital..	14,161,869	304,235	633,000	15,099,104
1872..	Received*	7,567,034	189,074	373,887	8,129,995
	Paid	5,402,644	140,630	293,386	5,836,660
	Capital	18,103,398	389,201	825,740	19,318,339
1874..	Received*	8,319,179	184,432	362,204	8,865,815
	Paid	6,410,824	171,264	294,007	6,876,095
	Capital..	21,825,787	417,936	913,746	23,157,469
1876..	Received*	8,963,813	187,883	449,985	9,601,681
	Paid	7,311,152	151,753	329,571	7,792,476
	Capital..	25,393,490	479,343	1,123,717	26,996,550
1877..	Received*	9,316,623	198,869	493,886	10,009,378
	Paid	7,735,795	168,497	360,879	8,265,171
	Capital..	26,974,318	509,715	1,256,724	28,740,757

* Including interest.

9. MISCELLANEOUS.

The following is a return of the quarterly averages of the weekly liabilities and assets of the Bank of England from 1862 to 1877:—

Years.	Quarter ended	Liabilities.			Assets.		
		Notes in Circulation.	Deposits.	Total.	Securities.	Bullion.	Total.
		£	£	£	£	£	£
1862	March 26	21,046 000	20,985,000	42,031,000	29,417,000	16,099,000	45,516,000
	June 25	21,557,000	21,548,000	43,105,000	29,953,000	16,369,000	46,322,000
	September 24	22,473,000	22,368,000	44,841,000	30,747,000	17,552,000	48,299,000
	December 31	21,129,000	21,985,000	43,114,000	30,961,000	15,351,000	46,312,000
1863	March 25	20,399,000	21,412,000	41,811,000	30,936,000	14,322,000	45,258,000
	June 24	21,116,000	21,911,000	43,027,000	31,386,000	14,878,000	46,264,000
	September 30	21,935.000	20,538,000	42,473,000	30,965,000	15,068,000	46,033,000
	December 30	21.730,000	20,805,000	42,535,000	31,777,000	13,934,000	45,711,000
1864	March 23	20,813,000	21,067,000	41,880,000	31,608,000	13,771,000	45,379,000
	June 22	21,263,000	20,648,000	41,911,000	31,702,000	13,485,000	45,187,000
	September 28	21,592,000	19,166,000	40,758,000	31,395,000	13,062,000	44,457,000
	December 28	20,771,000	19,070,000	39,841,000	29,570,000	13,636,000	43,206,000
1865	March 29	20,560,000	20,157,000	40,717,000	30,572,000	14,582,000	45,154,000
	June 28	21,525,000	20,850,000	42,375,000	30,967,000	15,388,000	46,355,000
	September 27	22,450,000	19,666,000	42,116,000	31,908,000	14,557,000	46,465,000
	December 27	21,819,000	18.365,000	40,184,000	30,613,000	13,601,000	44,214,000
1866	March 28	21,436 000	17,783,000	39,219,000	30,058,000	13,570,000	43,628,000
	June 27	24,588,000	22,198,000	46,786,000	37,384.000	13,571,000	50,955,000
	September 26	25,193,000	21,566,000	46,749,000	36.536,000	14,872,000	51,408,000
	December 26	23,728,000	22,740,000	46,468,000	33.110,000	17,478,000	50,588,000
1867	March 27	23.147.000	24,549,000	47,696,000	32,865,000	19,258,000	52,123,000
	June 26	23,538,000	24,896,000	48,434,000	32,319,000	20,117,000	52.436,000
	September 25	24,486,000	25,341,000	49,827,000	30,671,000	23,420,000	54.091,000
	December 24	24,706,000	23,850,000	48,556,000	29,960,000	22,561,000	52,521,000
1868	March 25	24,190,000	23,967,000	48,157.000	31,474,000	21,652,000	53,126,000
	June 24	24,503,000	24,474,000	48,977,000	32,460,000	21,238,000	53,698,000
	September 30	24,853,000	22,519,000	47,372,000	31,036,000	21,277,000	52,313,000
	December 30	24,336,000	22,409,000	46,745,000	33,935,000	18,981,000	52,916,000

1869	March 31	23,909,000	22,337,000	46,246,000	34,448,000	18,303,000	52,751,000
	June 30	23,834,000	21,827,000	45,661,000	34,133,000	17,718,000	51,851,000
	September 29	24,153,000	21,405,000	45,558,000	31,562,000	20,396,000	51,958,000
	December 29	23,910,000	21,305,000	45,215,000	32,373,000	18,827,000	51,200,000
1870	March 30	23,255,000	26,900,000	50,155,000	33,828,000	19,786,000	53,614,000
	June 29	23,576,000	26,303,000	49,879,000	32,530,000	20,460,000	52,990,000
	September 28	24,367,000	25,768,000	50,135,000	33,104,000	20,545,000	53,649,000
	December 28	24,539,000	24,196,000	48,735,000	29,513,000	22,311,000	51,824,000
1871	March	24,158,000	27,902,000	52,060,000	33,578,000	21,945,000	55,523,000
	June	24,705,000	28,762,000	53,467,000	32,391,000	24,192,000	56,583,000
	September	25,668,000	29,061,000	54,729,000	32,909,000	25,264,000	58,173,000
	December	25,625,000	28,010,000	53,635,000	33,827,000	22,952,000	56,779,000
1872	March	25,274,000	30,445,000	55,719,000	35,156,000	24,028,000	59.184.000
	June	25,880,000	29,446,000	55,326,000	36,561,000	21,978,000	58,539,000
	September	26,588,000	28,740,000	55,328,000	35,916,000	22,957,000	58,873,000
	December	25,983,000	26,645,000	52,628,000	34,468,000	21,379,000	55.847,000
1873	March	25,479,000	31,264,000	56,743,000	35,568,000	24,724,000	60,292,000
	June	26,169.000	31,503,000	57,672,000	39,156,000	21,744,000	60,900,000
	September	26,407,000	26,396,000	52,803,000	42,914,000	23,464,000	56,378,000
	December	26,219,000	25,079,000	51,298,000	33,633,000	20,869,000	54,502,000
1874	March	25,960,000	26,308,000	52,268,000	32,904,000	22,927,000	55,831,000
	June	26,628,000	26,753,000	53,381,000	34,154,000	22,376,000	56,530,000
	September	27,166,000	23,597,000	50,763,000	31,457,000	22,846,000	54,303,000
	December	26,877,000	23,748,000	50,617,000	32,679,000	21,028,000	53,707,000
1875	March	26,313,000	24,743,000	51,056,000	33,103,000	21,445,000	54,548,000
	June	27.461.000	25,574,000	53,035,000	33.796,000	22,346,000	56,142,000
	September	28,673,000	29,067,000	57,740,000	32,917,000	28,322,000	61,239,000
	December	28,356,000	26,267,000	54,623,000	34,134.000	23.579,000	57,713,000
1876	March	27,118,000	26,662,000	53,780,000	34,336,000	22,932.000	57,268,000
	June	27,917,000	28,610,000	56,527,000	32,513,000	27,120.000	59,633,000
	September	28.653,000	33,669,000	62,322,000	32,314,000	33,456,000	65,770,000
	December	28,565,000	33,043.000	61,608,000	33.440,000	31,272,000	64,712.000
1877	March	27,946,000	31,163,000	59,109,000	35,680,000	26,898,000	62,578.000
	June	28,535,000	29,260,000	57,795,000	35,291,000	25,613,000	60,904,000
	September	28,619,000	28,038,000	56,657,000	34,235,000	25.857,000	60,092,000
	December	27,762,000	25,138,000	52,950,000	32,953,000	23 128,000	56,081,000

AVERAGE GAZETTE PRICES OF BRITISH WHEAT,

MONTHS.	1863.	1864.	1865.	1866.	1867.	1868.	1869.
	WHEAT						
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January ..	47 4	40 6	38 6	45 10	61 4	70 3	51 9
February ..	46 11	40 7	38 3	45 6	60 10	73 0	50 4
March ..	45 5	39 11	38 4	45 3	59 9	73 0	48 1
April	45 7	39 9	39 6	44 10	61 6	73 3	46 4
May	46 4	39 3	41 0	46 2	64 8	73 9	44 9
June	46 8	39 8	41 5	48 3	65 4	67 11	45 11
July	46 6	42 4	42 7	54 1	65 0	65 5	49 10
August ..	46 0	43 1	43 3	50 6	67 8	57 7	52 8
September ..	44 2	41 10	44 0	48 11	62 8	54 7	50 8
October ..	40 8	38 9	41 10	52 4	66 6	53 8	47 4
November ..	40 0	38 9	45 7	56 6	69 5	51 8	46 6
December ..	40 10	38 1	46 7	60 3	67 4	49 11	43 9
The Year ..	44 9	40 2	41 10	49 11	64 5	63 9	48 2
	BARLEY						
January ..	35 0	31 11	28 5	32 9	44 3	41 10	48 6
February ..	36 3	31 11	29 1	33 8	44 4	42 6	47 2
March	36 7	31 3	28 10	35 11	41 0	43 3	45 0
April	35 8	30 10	29 7	36 10	39 6	43 11	44 1
May	34 1	29 7	29 6	36 3	38 10	43 8	39 5
June	31 6	28 2	28 1	35 1	36 2	40 3	34 9
July	30 0	27 6	27 11	34 5	35 2	37 5	31 11
August ..	31 9	28 6	28 3	34 1	37 3	41 1	32 4
September ..	35 0	31 8	30 8	37 2	39 11	43 8	37 6
October ..	34 4	30 3	30 9	42 0	41 3	45 6	38 1
November ..	33 11	29 10	32 10	44 10	42 2	46 10	38 5
December ..	32 8	28 5	33 0	45 2	40 11	45 10	36 3
The Year ..	33 11	29 11	29 9	37 5	40 0	43 0	39 5
	OATS						
January ..	20 6	18 9	19 2	23 0	24 0	25 7	26 6
February ..	21 4	19 2	19 7	23 4	24 3	26 1	27 10
March ..	21 5	19 5	20 9	23 10	24 7	27 1	27 7
April	21 6	19 3	22 0	24 5	24 9	28 0	26 10
May	22 1	19 8	23 1	25 1	26 0	28 10	26 11
June	22 10	20 2	23 2	25 11	27 5	29 10	27 4
July	23 2	21 6	23 1	27 1	28 0	30 4	26 10
August ..	23 0	22 5	23 10	26 2	28 8	29 9	27 2
September ..	21 1	21 6	21 8	24 8	26 11	28 0	25 10
October ..	19 0	20 1	20 10	22 11	25 8	27 8	24 1
November ..	19 2	19 10	22 3	23 6	25 11	28 0	23 4
December ..	19 2	19 6	22 10	24 10	25 2	27 8	22 2
The Year ..	21 2	20 1	21 10	24 7	26 0	28 1	26 0

BARLEY, and OATS, per IMPERIAL QUARTER in EACH MONTH.

1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
.. ..	WHEAT.						
s. d.	s. d.	s. d.	s. d	s. d.	s. d.	s. d.	s. d.
43 8	52 8	55 4	55 9	62 7	44 1	44 9	51 7
41 3	53 6	55 8	56 4	62 11	41 8	43 1	51 7
41 5	54 1	55 1	55 6	60 11	41 6	43 0	51 1
42 7	57 8	54 2	54 10	60 0	43 0	44 11	53 4
44 6	59 0	56 3	56 0	62 2	42 3	45 1	65 10
47 5	59 9	58 11	58 7	61 0	42 3	47 5	64 6
50 10	58 8	58 6	59 6	60 8	46 5	48 3	62 9
53 10	57 10	59 8	60 6	57 6	52 10	46 0	64 11
47 3	57 0	58 4	64 2	47 7	48 4	46 8	59 1
47 0	56 5	58 6	60 10	44 6	46 4	46 6	53 7
50 1	56 2	56 10	60 9	43 9	47 2	47 11	52 3
52 4	56 2	56 6	61 8	44 9	46 3	49 9	51 6
46 10	56 8	57 0	58 8	55 8	45 2	46 2	56 9
.. ..	BARLEY.						
35 11	35 3	37 1	40 1	45 8	44 11	34 5	39 3
34 5	35 7	38 6	40 4	48 11	43 10	33 5	40 4
34 0	35 11	37 4	39 10	48 4	42 0	32 8	40 9
34 7	36 8	36 3	39 1	48 11	40 10	33 10	40 11
33 3	37 2	36 2	38 4	46 11	38 5	34 1	39 11
32 8	37 0	34 7	37 2	42 9	35 10	32 11	35 7
31 7	35 3	32 5	36 6	40 9	34 6	32 9	35 4
33 8	35 2	33 2	37 7	44 6	35 0	32 2	34 1
36 1	35 5	37 4	43 11	42 10	35 5	37 8	40 2
36 7	36 6	42 1	43 9	42 8	37 0	39 4	43 1
36 7	37 0	42 8	44 0	42 7	37 11	39 3	43 3
35 4	36 10	41 6	44 9	44 2	35 4	38 9	43 8
34 7	36 2	37 5	40 5	44 11	38 5	35 2	39 8
.. ..	OATS.						
20 8	22 11	22 6	22 2	26 11	29 5	24 2	24 9
20 2	23 11	22 9	21 11	28 7	29 8	24 5	25 4
20 11	25 2	22 8	23 3	28 7	29 11	25 1	25 6
21 2	27 0	22 3	23 10	28 5	29 10	25 8	25 2
23 0	27 2	23 5	25 4	29 7	30 3	26 7	27 10
23 9	27 0	23 4	26 7	30 4	31 6	28 1	27 1
26 1	27 6	24 4	28 9	30 4	30 1	29 10	28 1
26 9	26 11	25 1	28 7	30 10	30 8	29 0	28 0
23 5	24 10	23 0	27 7	28 1	28 3	26 7	26 9
22 3	23 2	22 11	25 3	27 7	24 10	25 3	23 10
23 5	23 5	22 9	25 4	28 0	25 6	25 7	24 5
23 4	23 0	22 10	26 1	29 1	24 6	25 1	24 0
22 11	25 2	23 2	25 5	28 10	28 8	26 3	25 11

Consumption of Tobacco.—The following table shows the consumption of tobacco in proportion to the population, at certain periods between 1841 and 1876:—

Year.	Total Population of Great Britain and Ireland.	Pounds Weight of Tobacco cleared for Consumption.	
		In the United Kingdom.	Per head of Population.
			lbs. ozs.
1841	26,700,000	23,096,281	0 13¾
1851	27,347,000	27,734,786	1 0¾
1861	28,887,000	35,413,846	1 3¾
1871	31,724,000	42,656,658	1 5¾
1873	32,340,000	46,315,070	1 6¾
1874	32,656,056	46,991,590	1 7
1875	33,004,219	49,051,830	1 7¼
1876	33,356,674	49,261,926	1 7¼

The following shows the number of samples of tobacco analysed in the laboratory of the Inland Revenue Department at Somerset House, for the years 1874, 1875, and 1876:—In 1874, 334, of which 220 were found genuine, 114 adulterated; in 1875, 244, of which 106 were genuine, 138 adulterated; and in 1876, 369, of which 234 were genuine and 135 were adulterated.

Adulterated Beer.—The analyst appointed by the Inland Revenue Department reports that during the year 1877 89 samples of beer and of materials used in the brewing of beer were examined, of which 61 were either adulterated or consisted of illegal ingredients. There is much reason to believe that the use of sugar by brewers who have not a licence to use the same is extending, especially among small brewers in the Midland counties. During the year 16 samples of wort have been found to contain sugar which had been surreptitiously used, and in 17 cases sugar, of a kind unsuited for domestic use, has been found in breweries. Most of the cases, both of sugar and illegal wort, occurred in one of the mining districts of Staffordshire. In such districts a demand exists for weak beer among the miners while at work, and as such beer does not require to be clear, and is consumed soon after being made, it affords more than ordinary facilities for the illegal use of sugar. In 8 cases beer was found in the possession of publicans in London to which they had illegally added sugar, and in 6 instances sugar intended to be added to beer was found in their possession.

The City of London Markets.—The Court of Common Council had lately under their consideration the annual report of the Clerk and Superintendent of the London Central Meat, Poultry, and Provision Markets, on the business and revenues thereof for 1877. Subjoined are the total receipts for the several years since the opening of the market:—1870, 49,850*l*.; 1871, 50,554*l*.; 1872 (53 weeks), 51,702*l*., less one week (613*l*.); 1873, 51,165*l*.; 1874, 51,522*l*.; 1875, 53,149*l*.; 1876. 68,254*l*. For the year 1877 the total receipts were 69,477*l*. 17*s*. 7*d*. To the several foregoing totals must, as usual, be added the rent of the sub-structure of the meat market, 2,000*l*. a year, paid by the railway companies. The new poultry and provision market, having now been opened upwards of two years or more, a comparison of the figures for 1876 and 1877 may now be made, and the result shows that the business of the market is still increasing; the total received during the last year amounted to 21,959*l*. 1*s*. 10*d*., or an increase of 2,761*l*. 16*s*. 1*d*. on the year 1876, which year showed the largest amount of receipts up to that time. The completion of the south-eastern portion of the poultry and provision market has been a matter receiving the best attention of the committee, and though, in common with other large works, it has suffered by the disputes in the building trade, the committee had the satisfaction to state that the opening may now be looked for at an early date, and no time will be lost in allotting the new shops and bringing them into rental. Pending the time when the markets shall be in full operation, the revenue account, it is said, as there given, must remain an estimate; meanwhile it was satisfactory to observe that the tolls for 1877 showed a marked increase upon the amount given in such estimate, and that, indeed, as remarked by the Clerk and Superintendent in the opening paragraph of his report, the annual increase of business in former years had not only been maintained, but very much exceeded in the past year.

Civil Service Co-operation.—The report of the Civil Service Supply Association for the half-year ended the 30th of June last, shows a net balance for the half-year available for distribution to the shareholders of 19,460*l*. 17*s*. 7*d*.—a larger

amount than has ever been available for division. The number of shares is limited to 4,500, and of these 4,388 are at present held by members of the Civil Service, the rules now in force prohibiting any member from holding more than one share. A proposal to alter this rule, and to allow each shareholder to hold five shares will be made at the meeting. During the half-year under account the business of the association has been carried forward at the three stores now open; the central store in Queen Victoria Street, the branch store in Chandos Street, and the special department store in Tavistock Street. Goods were bought during the six months to the value of 564,211*l.* 18*s.* 10*d.*, and sold to the amount of 645,076*l.* 4*s.* 9½*d.*, the stock in hand at the close of the half-year being valued at 191,574*l.* 14*s.* 9*d.* The gross profit on the trading amounted to 69,402*l.* 2*s.*, and 3,705*l.* 12*s.* 8*d.* received from other sources of revenue, brings up the total gross income to 37,107*l.* 14*s.* 8*d.* The working expenses were 50,858*l.* 17*s.* 11*d.*, being at the rate of 7*l.* 17*s.* 8*d.* per cent. on the sales. It appears from the balance sheet of the trading account that out of the total of 654,076*l.*, representing the sales for the half-year, 311,270*l.*, or nearly half, was in grocery, wine, provisions, and tobacco; 127,559*l.* in hosiery; 30,705*l.* in clothing; 163,117*l.* in fancy goods, stationery, &c.; and 12,422*l.* in china and glass. The trade expenses for the half-year include: Rent, 3,128*l.*; salaries, 30,689*l.*; carriage and booking, 3,566*l.*; paper, string, straw, &c., 4,244*l.*; stationery and printing, 2,415*l.*; postage, 961*l.*; and "miscellaneous trade expenses" (including the dinners of the Committee and the refreshments of the employés, to which exception has been taken at the meetings) amounting to 810*l.* The staff of the association, in addition to the committee and treasurer, who are members of the Civil Service, include a secretary at 600*l.* a year; seventeen clerks in the secretary's department, at salaries ranging from 50*l.* to 265*l.*; an accountant at 210*l.*, with twenty-one clerks at salaries varying from 30*l.* to 150*l.*; two storekeepers in the grocery department at 500*l.* and 270*l.* with seven assistant storekeepers at salaries of 135*l.* to 200*l.*, two clerks at 170*l.* and 78*l.*, and 290 assistants at wages of 8*s.* to 2*l.* 10*s.* a week; one storekeeper in the hosiery department at 356*l.*, two assistant storekeepers at 275*l.* and 100*l.*, and ninety assistants at wages varying from 10*s.* to 2*l.* 15*s.* a week; three storekeepers in the clothing department at salaries of 400*l.*, 109*l.*, and 104*l.*, and thirty-eight assistants with wages from 10*s.* to 5*l.* 10*s.* a week; two storekeepers in the fancy department at 475*l.* and 230*l.*, and two assistants at 200*l.* and 180*l.*; and nine storekeepers and dispensers in the other departments, at salaries of 145*l.* and upwards; 167 assistants in the fancy department at wages varying from 8*s.* to 3*l.* a week; one storekeeper and twenty-seven assistants in the china and glass department at wages from 6*s.* a week to 250*l.* a year; two chief cashiers at 300*l.* and 200*l.*, and seventy-six cashiers at 30*l.* to 120*l.* a year; four mechanics from 1*l.* 10*s.* to 3*l.* a week; thirty-three servants at 8*s.* to 2*l.* 2*s.* a week. The total wages and salaries for the half-year were 31,321*l.*, and overtime was paid 1,138*l.*

Scotch Fisheries.—The report of the Scotch Fishery Board for the year 1877 has been published. It appears from it that the total quantity of herrings cured at the Scotch stations was 847,718 barrels, while 561,985 barrels were exported. These figures exhibit a large increase over those for 1876, which was a very unfavourable year for the fishermen, and they also show an increase over average years. The number of fishing boats stationed on the Scotch coast last year was 14,623; the number of men and boys employed 45,890, and the value of the boats and material 1,178,000*l.*

State Pensions.—The year's public accounts show that the following annuities are payable out of the public purse:—4,000*l.* a year to the heirs and descendants of William Penn for ever: 1,080*l.* to the heirs of the Duke of Schomberg; 1,200*l.* hereditary pension to the Earl of Bath; 5,000*l.* to the person to whom the title of Earl Nelson shall descend; 4,000*l.* to whom the title of Duke of Marlborough shall descend; 3,000*l.* to the representatives of Jeffery, Earl Amherst; 2,000*l.* to the heirs male on whom the title of Viscount Exmouth shall descend; 2,000*l.* to all and every heirs male on whom the title of Lord Rodney shall descend: 676*l.* hereditary pension of the Earl of Kinnoul. The following are not among the perpetual pensions, but are payable during the life of the present holder of the title mentioned and his next successor:—The Duke of Wellington, 4,000*l.* a year; Viscount Hardinge, 3,000*l.*; Viscount Combermere, 2,000*l.*; Lord Seaton, 2,000*l.*; Lord Keane, 2,000*l.*; Lord Gough, 2,000*l.*; Lord Raglan, 2,000*l*; Lord Napier of Magdala, 2,000*l.*

The Session of 1878.—In the Session of 1878 the House of Commons sat on 136 days, the House of Lords on little more than 100 days. The House of Commons sat for very nearly 1,100 hours, and even this number does not include the two hours from 7 to 9 o'clock during which that House, when it has a morning sitting, suspends business in fact, though without a formal adjournment. The House of Lords sat for less than a sixth of the above number of hours. The House of Commons sat beyond midnight 85 times, and on 13 nights sat until later than 3 a.m., extending its sitting of the 2nd of August until past 4

o'clock of the next morning, its sitting of the 1st of April until past 6 a.m., and its sitting of the 13th of May until half-past 9 of the next morning. The House of Commons divided 278 times; there was one tie, 40 against 40, and the Speaker had to vote. The report of the proceedings in the two Houses in the Session of 1878 has filled more than 1,200 columns of the "Times." The flood of "Parliamentary Papers" has not failed in 1878. No less than 49 relate to Turkey. Shortly before the close of the Session a large number was presented to the House of Commons, probably many of them "in dummy," to be issued during the recess as and when they shall be ready for circulation. Among those which we may expect is the Roll of Members of Parliament from the year 1213 to the present time. The bill containing the proposed Criminal Code has place among the remarkable papers of the Session. There may also be noticed the issue of a short Index to Reports of Secretaries of Legation from 1871 to 1877, continued since then in each subsequent volume of these reports.

THE CHARITY COMMISSION.—The Report of the Charity Commissioners for England and Wales for the year 1877, has been printed as a Parliamentary paper. The report states that the total amount of stocks and investments held by the official trustees of charitable funds on December 31, 1877, was 7,793,660*l.* 15*s.* 9*d.*, divided into 8,793 separate accounts. During the past year the particulars of 226 charities newly created or previously unrecorded in any official enumeration of charitable trusts have been entered in the register of "unreported charities." With respect to the accounts of charities, the Commissioners observe:—"In our Fourteenth Report we laid special stress on the fact that the obligation to make returns, and a liability to have that obligation enforced, induces accuracy on the part of administrators of charities in the discharge of their duties. We are of opinion, however, that this advantage would be more certainly secured if further provision were made by law for giving increased publicity to these statements of accounts when thus rendered." The benefits to be derived from a due publication of these accounts may, they think, be secured without any general examination or central audit of all the accounts rendered, and they are disposed to suggest that they should be empowered, whenever they think it desirable, on inspection of the accounts or otherwise, to direct an inspector or other officer of the board to institute a special audit of the accounts of any charity, with the powers incident to the audit of poor-rate accounts, under the provisions of the Poor Law Amendment and Poor Law Audit Acts. On their account of proceedings under the Endowed Schools Acts, the Commissioners state that the aggregate income of the foundations which are now regulated by schemes under the Endowed Schools Acts amounts to 209,222*l.* and further schemes have been submitted to the Education Department, which, if they should become law, will add 32,665*l.* a year to this total.

DOGS.—The rapid growth of the number of dogs in this country of late years is very remarkable, if the figures in a Parliamentary paper lately issued are a test. This contains returns of the number of dogs assessed to the dog tax in each year from April 5, 1866, to April 5, 1868, when the assessed tax on dogs expired, and of the number of licences granted for dogs during each of the eleven years from 1867 to 1877 (both dates included), ending on the 31st of December in each year. It seems from the figures that the number of dogs assessed to the dog tax in Great Britain in the year ending April 5, 1867, was 445,656, and in the year ending April 5, 1868, 439,423. In 1867, when the licence system was first brought into operation, the number of licences granted was 828,320; in 1868, 907,745; in 1869, 1,006,806; in 1870, 1,064,621; in 1871, 1,123,023; in 1872, 1,137,163; in 1873, 1,176,262; in 1874, 1,252,068; in 1875, 1,302,158; in 1876, 1,362,176; and in 1877, 1,392,176. The increase of these faithful animals during the last eleven years is no doubt in great measure attributable to the alteration of the method under which they are made to contribute to the needs of the Exchequer; but part of the apparent increase is probably real, and will continue unless checked by a hydrophobia panic. A return is given in the paper quoted of the number of deaths from this disease during each of the eleven years from 1866 to 1876, inclusive, in each county in England and Wales, which shows that in 1866 the deaths from hydrophobia numbered 36; in 1867, 10; in 1868, 7; in 1869, 11; in 1870, 32; in 1871, 56; in 1872, 39; in 1873, 21; in 1874, 61; in 1875, 47; and in 1876, 53. The numbers for 1877 are not given, as the causes of death for that year have not yet been abstracted by the Registrar-General.

COURT FEES.—The amount of fees in the three divisions of the High Court of Justice—Queen's Bench, Common Pleas, and Exchequer—amounted to 81,591*l.* 2*s* 2*d.*, in the year ended the 31st of March last, and in the previous year to 82,203*l.* 5*s.* 9*d.* In the Queen's Bench Division the increase this year was 646*l.* 18*s.* 2*d.*, and in the Common Pleas 2,059*l.* 6*s.*, while the decrease in the Exchequer was 3,318*l.* 7*s.* 9*d.* After deducting the increase, there was a net decrease of 612*l.* 3*s.* 7*d.*

MINERALS AND METALS.—The returns obtained by the Mining Record Office enable Mr. Robert Hunt, the Keeper of Min-

ing Records, to report that the mineral produce of the United Kingdom, in the year 1877, was of the total value of 58,398,071*l.* The foremost item is that of coal, which Mr. Hunt puts at 134,610,763 tons, of the estimated value of 47,113,767*l.* The iron ore he states at 16,692,802 tons, of the value of 6,746,668*l.*; lead ore, 80,850 tons, value 1,123,952*l.*; tin ore (black tin), 14,142 tons, value 572,763*l.*; copper ore, 73,141 tons, value 262,271*l.*; salt, 2,735,001 tons of the value of 1,504,250*l.* Passing to the metals obtained from these ores, we find the total value of metals produced in 1877 stated by Mr. Hunt at 18,742,960*l.* The great item here is 6,608,664 tons of pig iron, of the value of 16,191,236*l.*, and it is stated that, in its manufacture, 15,342,445 tons of coal were used. Among the metals produced in the year are likewise 61,403 tons of lead, of the value of 1,262,600*l.*; also 9,500 tons of tin, of the value of 695,162*l.*; and 4,486 tons of copper, of the value of 340,067*l.* There were 501,435 oz. of silver obtained, almost all from lead, of the value of 114,877*l.*, and 143 oz. of gold, almost all from Merionethshire, of the value of 656*l.* The total value of minerals and metals obtained from the mines, &c., of the United Kingdom in 18[illegible]ched 68,281,406*l.*, namely, 18,742,9[illegible]., the value of metals, 47,113,767*l.* coal, and 2,424,679*l.* minerals, earthy, not reduced, together with the value of salt, clays, &c. Of he pig iron produced in 1877 there were 4,888,991 tons made in England, one-third of it in Yorkshire; 737,673 tons were made in Wales and Monmouthshire, and 982,000 tons in Scotland. Mr. Hunt states the coal produce of 1877 as 400,000 tons above the quantity returned by the Coal Mine Inspectors, and he computes the coal produce of Durham and Northumberland, in the year, at 31,210,400 tons; of Yorkshire at 15,960,550 tons; of Lancashire at 17,621,531 tons; Derbyshire, 6,973,550 tons; Staffordshire and Worcestershire, 13,991,166 tons; Wales and Monmouthshire, 19,464,700 tons; Scotland 18,320,074 tons.

BENEFICES RESIGNATION ACT.—A return procured by Mr. Majendie, M.P., shows that 230 livings have been resigned under the provisions of the "Benefices Resignation Act," which has been in operation seven years. In the Canterbury diocese there have been 8; in York 20; in London 8; in Durham 5; in Winchester 7; in Bangor 2; in Bath and Wells 5; in Carlisle 7; in Chester 12; in Chichester 6; in Ely 9; in Exeter 9; in Gloucester and Bristol 5; in Hereford 3; in Lichfield 11; in Lincoln 13; in Llandaff 1; in Manchester 6; in Norwich 17; in Oxford 12; in Peterborough 13; in Ripon 8; in Rochester 14; in Salisbury 4; in St. Asaph 4; in St. David's 7; and in Worcester 14. In the cases of Hale Magna, Syderstone, and Stock Harward, the Commissioners reported against any resignation. The sums granted to the retiring incumbents vary considerably; but we give two dioceses examples:— Carlisle. — Wasdale Heat (vicar's age 77), 85*l.*–28*l.*; Waberthwaite, 130*l.*–43*l.*; Brampton (64), 520*l.*–150*l.*; Killington (69), 106*l.*–35*l.*; Longmarton (78), 9*l.*–280*l.* (*sic*); Edenhall (67), 226*l.*–50*l.*; Ousby (58), 311*l.*–100*l.* Ely.—Stanningfield, 353*l.*–115*l.*; Hopton, 293*l.*–25*l.*; Over, 202*l.*–60*l.*; Biggleswade, 424*l.*–130*l.*; Farndish, 195*l.*–60*l.*; Little Wilbraham, 390*l.*–130*l.*; Lolworth, 199*l.*–66*l.*; Wyton, 557*l.*–180*l.*; Chatteris, 1,624*l.*–450*l.*

METROPOLITAN WATER COMPANIES.—The accounts annually rendered to the Local Government Board by the Metropolitan Water Companies show the following results for last year, classing the companies in alphabetical order:—The Chelsea Waterworks Company states the water rents accrued at 93,222*l.*, and the charges for maintenance and management at 31,827*l.* The East London shows 194,056*l.* water rents accrued, and for maintenance and management 79,083*l.* The Grand Junction, 129,248*l.* water rents accrued, and for maintenance and management 55,779*l.* The Kent, 80,547*l.* water rents accrued, and maintenance and management 24,450*l.* The Lambeth, 140,211*l.* water rents accrued, and maintenance and management 51,841*l.* The New River, 379,595*l.* water rents accrued, and maintenance and management 131,893*l.* The Southwark and Vauxhall, 153,267*l.* water rents accrued, and maintenance and management 79,814*l.* The West Middlesex, 157,139*l.*, water rents accrued, and maintenance and management 54,626*l.* The totals are:—1,327,285*l.* the amount of water rents accrued, and 509,403*l.* for maintenance and management, this latter item including 18,100*l.* for allowance to directors. The capital expenditure to the end of the year is stated as follows:—Chelsea Company, 1,126,724*l.*; East London, 1,942,137*l.*; Grand Junction, 1,175,491*l.*; Kent, 638,500*l.*; Lambeth, 1,325,659*l.*; New River, 2,980,214; Southwark and Vauxhall, 1,759,862*l.*; West Middlesex, 962,818*l.*; making a total of 11,911,405*l.* The amount of "water rents accrued" is not quite all realized, being subject to a deduction for bad debts and houses empty.

GROCERS' LICENCES.—A Parliamentary return shows that the number of licences issued to spirit dealers in England to retail spirits for consumption off the premises in the years which ended the 31st of March, 1875, 1876, and 1877, was in 1875, 4,402; in 1876, 4,706; and in 1877, 5,100. The number of grocers and other persons in England keeping shops for the sale of goods other than intoxicating liquors who had on the 1st of January, 1878, licences for sale by retail of beer, spirits or wine not to be consumed on the premises was as

follows:—Holding beer licences only, 8,301; holding spirit licences only (bottle), 288; holding wine licences only, 1,732; holding both beer and spirit licences, 272; holding beer and wine licences, 588; holding spirit and wine licences, 1,402; holding beer, spirit, and wine licences, 1,832; grocers selling spirits in bottles, but who have not obtained a magistrate's certificate, 95.

THE CORPORATION OF LONDON.—The Chamberlain of London, Mr. Benjamin Scott, has recently presented, in that capacity, an account in respect of the city's estate for the year 1877, and also in reference to various public and trust funds, in conformity with certain resolutions of the Court of Common Council agreed to on the 16th of November, 1871, upon a report of the Coal, Corn, and Finance Committee, presented on the 19th of October in that year. An abstract of the account shows, under the head of receipts, that those receipts amounted in all to 667,912*l.* 11*s.*, and the expenditure to 367,496*l.* 16*s.* 7*d.*, the balance in the Corporation Chambers on the 31st December, amounting to 17,632*l.* 19*s.* 4½*d.* This consisted of, among other items, rents and quit-rents, 109*l.* and 178*l.* 2*s.* 4½*d.*; renewing fines, 2,378*l.* 3*s.* 5*d.*; bequests, 105*l.* 13*s.* 4*d.*: rents, &c., in connexion with West Ham Park, 212*l.* 13*s.* 6*d.*; interest on Government securities, 3,346*l.* 2*s.* 10*d.*; ditto on purchase-money of properties sold, 877*l.* 16*s.* Metropolitan Cattle Market, Islington, 30,925*l.* 15*s.* 11½*d.* London Central Meat, Poultry, and Provision Markets, 76,451*l.* 3*s.* 2*d.*; Leadenhall, 22,601*l.* 14*s.*; Farringdon, 2,491*l.* 15*s.* 1*d.*: Smithfield (Hay Market), 173*l.* 8*s.* 2*d.*; Billingsgate, 18,208*l.* 11*s.* 10*d.*; voluntary metage on grain, &c., 22,446*l.* 0*s.* 7½*d.*; fruit metage, 1,456*l.* 8*s.* 5*d.*; stamping weights and measures, 110*l.* 16*s.* 10*d.*; brokers' rents, 8,689*l.*; justiciary fees, &c., at the Mansion House and Guildhall, 17,011*l.*; grant, in aid of the maintenance of pauper lunatics, 998*l.* odd; ditto on account of criminal prosecutions, 2,023*l.*; to fire insurance companies for damage by fire to the Sessions House, 1,900*l.*: the Mayor's Court fees (gross), 6,472*l.* 12*s.* 11*d.*; officers' surplus fees and profits, 3,643*l.* 13*s.* 8*d.*; sundry officers' balance of accounts of receipts and payments, 297*l.* 18*s.* 7*d.*; contribution towards fire hydrants, 568*l.*; sundry and casual receipts 1,371*l.* 5*s* 1*d.*; making in all 282,105*l.* odd. The fees received for business transacted before the Lord Mayor at the Mansion House, including sundry penalties, amounted to 766*l.* 6*s.* 5*d.*, and those at the Guildhall justice-room to 944*l.* 14*s.* Under the head of education and kindred subjects the expenditure amounted to 4,687*l.* odd, including a contribution to the National Training School for Music for ten free scholarships of 40*l.* per annum each. On the other hand, 2,020*l.* 17*s.* 6*d.* was absorbed under the Public Health Act of 1872.

SAVINGS BANKS.—It appears from a return which was presented to the House of Commons in the month of July last that the number of savings banks which had been closed under the provisions of 26 Vict., cap. 14, or otherwise up to November last, and had transferred their funds or any part of them to the Post Office savings banks, was in England 157, in Wales 13, in Scotland 7, and in Ireland 19—making a total of 196. The number of depositors in those banks was, on the 20th of November previous to the date of notice to close, in England 181,268, the amount of their balances being 4,379,376*l.* 18*s.* 10*d.*; in Wales, 5,413, the balances being 146,935*l.* 15*s.* 1*d.*; in Scotland, 2,469, with balances amounting to 23,516*l.* 17*s.* 10*d.*; and in Ireland, 6,463, with balances to the extent of 200,016*l.* 10*s.* 10*d.*; giving a total of 195,613 persons, with balances amounting to 4,749,846*l.* 2*s.* 7*d.* The following is a statement of the number who have transferred their funds to the Post Office savings banks, and the amount of their accounts:—England 101,992 persons, amount transferred, 2,532,336*l.* 8*s.*; Wales, 1,788, amount transferred, 48,739*l.* 19*s.* 1*d.*; Scotland, 238, amount transferred, 634*l.* 9*s.* 3*d.*; while in Ireland the sum transferred by 1,818 persons amounts to 61,475*l.* 9*s.* 5*d.*; giving a total of 105,836 persons, whose transferred accounts amount to 2,643,186*l.* 5*s.* 9*d.* Compensation to officers under the provisions of the Act has been paid in England to the extent of 33,091*l.* 12*s.*, in Wales of 951*l.* 14*s.* 11*d.*, in Scotland of 62*l.* 10*s.* 2*d.*, and in Ireland of 702*l.* 13*s.*—total, 34,808*l.* 10*s.* 1*d.* It may be added that, in addition to the amounts stated as having been transferred, it is estimated by the Post Office authorities that 233,648*l.* has been paid in cash by about 12,867 of the depositors in the closed savings banks to the Post Office.

CHRONICLE OF EVENTS AND OCCURRENCES.

Home and Foreign.

From November, 1877, to November, 1878.

1877.

Nov. 9. Lord Beaconsfield stated at the Guildhall Banquet that the policy of England on the Eastern Question would continue to be that of "conditional neutrality."

10. The Marquis of Hartington elected Rector of Edinburgh University, defeating Mr. Cross by 932 to 684.

12. M. Grévy took his place as President of the French Chamber of Deputies.

14. Metropolitan Board of Works passed a resolution in favour of the purchase of the London Water Companies, and the provision of a new supply.

15. Mr. Gladstone elected Lord Rector of Aberdeen University by a majority of 544 over Sir Stafford Northcote.

18. Kars taken by the Russians, with 5,000 killed and 10,000 prisoners.

20. The detective police officers, who had been accomplices of the convicts Kurr and Benson, found guilty at the Central Criminal Court.

22. Lord Selborne elected Rector of St. Andrew's University by 15 votes over Mr. Hardy.

26. The Russians captured Etropol.

29. The British fleet ordered to remain in Besika Bay.

—. Bank rate reduced to 4 per cent.

Dec. 9. Surrender of Plevna to the Russians. Osman Pasha taken prisoner.

14. Servia declared war against Turkey.

15. The Queen visited Lord Beaconsfield at Hughenden.

16. The Porte invited the Mediation of the Powers with Russia.

17. The Powers declined to accede to the request of the Porte.

21. The Emperor of Germany presented the Iron Cross to Prince Charles of Roumania.

23. The Porte issued a proclamation deposing Prince Milan.

27. Don Carlos left France at the request of the French Government.

—. Sir John Strachey stated in the Legislative Council at Calcutta that 9,250,000*l.* had been expended by the Government for the relief of the sufferers by the famine.

29. The Sultan asked the intervention of the English Government.

1878.

Jan. 1. Proclamation of the Queen as Empress of India at Calcutta, and establishment of the Order of the Crown of India.

5. Mr. W. E. Forster spoke strongly at Bradford against any attempt to disestablish the Church of England.

10. Bank rate reduced to 3 per cent.

11. The army of the Schipka Pass taken by the Russians.

15. Cleopatra's Needle left Ferrol.

—. The Convocation of London University by 242 to 132 adopted a supplemental charter empowering the granting of degrees to women.

17. Opening of Parliament by Commission.

18. The Address to the Crown carried in the House of Commons against a Home Rule Amendment by 301 to 48.

Jan. 21. Cleopatra's Needle reached the East India Docks.
—. The Russians occupied Adrianople.
—. Irish Sunday Closing Bill read a third time in the Commons.
22 Mr. H. M. Stanley returned from Africa.
23. Marriage of the King of Spain to the Princess Mercedes.
24. Supplementary Vote of 6,000,000*l.* for military and naval services announced in the House of Commons.
25. Lord Carnarvon's resignation of the Colonial Secretaryship announced.
—. Turkey accepted the Russian terms for an armistice.
—. Mr. E. W. Hobson announced as Senior Wrangler at Cambridge.
26. King Humbert took the oaths as successor to Victor Emmanuel on the throne of Italy.
31. Armistice ratified at Constantinople.
—. Meeting at the Guildhall in favour of the Government policy on the Eastern Question.

Feb. 3. Thessaly invaded by Greek troops.
4. The Duke of Northumberland took office as Lord Privy Seal and Sir M. H. Beach as Colonial Secretary.
-. New Ministry at Constantinople; the office of Grand Vizier abolished.
-. Servia suspended hostilities.
7. Announcement in both Houses of Parliament that the Russians were within thirty miles of Constantinople.
8. Terms of the Armistice between Russia and Turkey read in the House of Lords, and the Ministers announced that six English ships had been directed to proceed from Besika Bay to Constantinople.
9. The vote of credit for 6,000,000*l.* carried by 328 to 124, Lord Hartington and Mr. Forster not voting.
—. The Russians occupied the outworks of Constantinople.
13. Deputation of delegates of the Metropolitan Vestries to the London School Board to complain of the increasing education rate.
—. The British ships passed through the Dardanelles.
—. Lord Derby in a despatch to Russia protested against the occupation of Constantinople.
14. Mr. J. Lowther, M.P., appointed Chief Secretary for Ireland in succession to Sir M. H. Beach.
15. Mr. Osborne Morgan's resolution in favour of an alteration of the Burials Laws rejected by the Commons by 242 to 227.
—. The English ships reached Prince's Island, off Constantinople.
—. The Metropolitan Board of Works sanctioned the erection of Cleopatra's Needle at the Adelphi steps of the Thames Embankment.
16. The Senate of the United States passed the Silver Bill.
—. Close of the Nihilist trial at St. Petersburg; 160 persons sentenced to hard labour.
20. Cardinal Pecchi elected Pope in succession to Pius IX.
22. Attempted assassination of Sir George Jessel, Master of the Rolls, by the Rev. H. J. Dodwell.
26. Erzeroum occupied by the Russians.
27. Budget of the London School Board announced; estimated expenditure for the year, 546,803*l.*
—. Lord Napier of Magdala named as Commander-in-Chief of an Expeditionary Force.
28. The Court of Common Council, by 127 to 5, adopted the resolutions of Confidence in the Cabinet, passed at the Guildhall meeting, on the 31st ult.

March 1. Viscount Bury appointed Under-Secretary for War, and Earl Cadogan Under-Secretary for the Colonies.
2. Inspection of ships of war at Portsmouth by the Speaker and Members of the House of Commons.
3. Peace between Turkey and Russia; Treaty of San Stefano.
—. Pope Leo XIII crowned at St. Peter's.
5. Contagious Diseases (Animals) Bill read a second time in the Lords.
7. Debate in the Lords opened by the Duke of Argyll on the Treaties of 1856 and 1871.
—. King Humbert opened the Italian Parliament.
8. Appointment of a Royal Commission on Church Patronage on the motion of the Archbishop of York.
14. The Vernacular Press Bill for the suppression of seditious newspapers passed at Calcutta by the Council of the Governor-General.
—. Close of the London Masons' Strike after having been kept up from July 28th, 1877.
17. Ratifications of the San Stefano Treaty exchanged at St. Petersburg.
24. Her Majesty's ship "Eurydice" lost in a storm off the Isle of Wight, with 326 officers and men, two lives only being saved.
26. Russia refused to submit the Treaty of San Stefano to a Congress of the Great Powers.
—. Additional Bishoprics Bill read a second time in the Commons.
—. Inquest in the "Eurydice" case; verdict relieving the officers.
28. Lord Derby resigned the secretaryship for Foreign Affairs, the cause stated by Lord Beaconsfield being the calling out of the Reserves.
—. Bank rate raised to 3 per cent.
29. Stock Exchange Panic.

April 1. The Reserves called out.
10. Printing establishment of Messrs. T. Nelson and Sons, at Edinburgh, burnt down.
11. Mr. Charley, M.P., elected Common Sergeant of the city of London.
13. University Boat Race won by Oxford.
21. Hurricane in Spain, 300 fishermen drowned.
22. Great strike in Lancashire.
24. The Erie Railway, U.S.A., sold by auction.
26. The Rev. W. D. Maclagan, Vicar of Kensington, appointed Bishop of Lichfield.

May 1. Opening of the International Exhibition at Paris.
11. Attempted assassination of the Emperor of Germany.
—. Viscount Sandon took his seat as a Member of the Cabinet.
13. Budget Bill carried by 111 to 19. House sat through the night owing to the obstruction of the Irish Members in Committee on the Sunday Closing (Ireland) Bill.
14. Additional Bishoprics Bill read a third time in the Lords.
15. Serious riots among the operatives on strike in Lancashire.
16. Sanction of the Queen given to the betrothal of the Duke of Connaught to the Princess Louise Margaret of Prussia.
24. The German Reichstag rejected by 251 votes to 57 the Government Bill for the repression of Socialism.
27. Arrangements for Congress of Powers at Berlin announced with Russia's consent.
31. The German ironclad "Grosser Kurfürst" sunk off Deal and 284 lives lost.

June 1. Mr. Mackonochie condemned by Lord Penzance to three years' suspension for practising illegal ritual in St. Alban's, Holborn.
-. The College of Physicians celebrated the centenary of Harvey's discovery of the circulation of the blood.
2. The Emperor of Germany seriously wounded by a pistol shot from Dr. Nobiling, a Socialist.
3. England accepted the invitation to the Berlin Congress.
4. Anglo-Turkish Convention signed.
6. The Crown Prince of Germany invested with authority to act for the Emperor during His Majesty's illness.
7. Explosion in a Colliery near Sheffield, more than 200 lives lost.
-. 475,000*l.* named by the arbitrators as the price to be paid for Waterloo Bridge by the Metropolitan Board of Works.
8. Lord Beaconsfield left London for Berlin.
16. First formal meeting of Congress.
17. International Literary Congress at Paris.
19. Close of the Lancashire strike, the operatives accepting a 10 per cent. reduction of wages proposed by the masters.
—. Women's Disabilities Removal Bill rejected in the Commons by 219 to 140.
29. The Archbishop of Canterbury in his cathedral gave an address of welcome to the American bishops and other prelates assembled to attend the Lambeth Conference.

July 2. The Conference of Bishops opened at Lambeth Palace.
3. Habitual Drunkards Bill read a second time in the Commons.
-. Turkey gave a conditional assent to the Austrian occupation of Bosnia and Herzegovina.
8. The Anglo-Turkish Convention including the arrangement for the English occupation of Cyprus announced in the Lords by the Duke of Richmond and Gordon.
10. Hödel sentenced to death for the attempted assassination of the Emperor of Germany.
11. England took possession of Cyprus.
12. Close of Berlin Congress.
13. Sir Garnet Wolseley appointed High Commissioner and Commander-in-Chief at Cyprus, left for the island.
16. Public reception to Lord Beaconsfield and Lord Salisbury at Charing Cross, on their return from Berlin.
18. Statement in the Lords by the Prime Minister on the Berlin Congress and the Anglo-Turkish agreement.
22. The Queen invested Lord Beaconsfield with the Order of the Garter.
25. The motion for the grant to the Duke of Connaught on his marriage carried by 320 to 33.
27. Banquet given by the Conservative Party to Lord Beaconsfield and Lord Salisbury.

Aug. 1. Entry of Austrian troops into Herzegovina.
2. Close of Commons' debate on Eastern Question; majority for Government 338 to 195.
3. Freedom of City of London conferred on Lord Beaconsfield and Lord Salisbury, and Banquet to Ministers at the Mansion House.
6. "Scene" in the House of Commons; Major O'Gorman "named" by the Speaker and ordered to withdraw.
7. The order for the consideration of Major O'Gorman's conduct withdrawn on his apology to the Speaker.
8. In the Queen's Bench Division judgment given for Mr. Mackonochie on his application for a rule to prohibit the enforcement of Lord Penzance's judgment against him.

Aug. 9. Royal Commission on the City Parochial Charities gazetted.
12. Bank rate raised to 5 per cent.
13. Irish Sunday Closing Bill read a second time in the Lords.
14. British Association met in Dublin; inaugural address by the President, Mr. Spottiswoode.
—. Mr. Roebuck, M.P., sworn a member of the Privy Council.
15. Convention between Austria and Turkey for the occupation of Bosnia signed.
16. Parliament prorogued by Commission.

Sept. 3. The "Bywell Castle" ran down the "Princess Alice" on the Thames, the latter vessel sunk and upwards of 700 persons drowned.
4. Coroner's Inquest on the bodies recovered from the "Princess Alice" opened at Woolwich.
11. Colliery Explosion at Abercarne, South Wales; more than 270 lives lost.
12. Cleopatra's Needle placed erect on its pedestal on the Thames Embankment.
16. The Sultan recalled Midhat Pasha.
—. Death of Mrs. Bravo, at Southsea.
21. The Russians evacuated San Stefano.
23. Rejection by Shere Ali, Ameer of Cabul, of the Mission of Sir Neville Chamberlain, the Viceroy's representative.
24. Lord Cairns gazetted to an Earldom.
28. Alderman Sir C. Whetham elected Lord Mayor of London.
30. First meeting at Constantinople of the Commission for organizing Roumelia.

Oct. 1. The Church Congress met at Sheffield, with the Archbishop of York as President.
-. Stoppage of the City of Glasgow Bank.
5. Waterloo and Charing Cross Bridges thrown open free of toll.
11. The Middlesex Magistrates refused to renew the Music and Dancing Licence of the Argyll Rooms by 33 votes to 16.
—. Panic in a Liverpool music hall causing 37 deaths.
13. Irish Sunday Closing Act came into operation.
14. Bank rate raised to 6 per cent.
19. The bill for the repression of Socialism read a third time and passed in the German Parliament.
21. Distribution of prizes at the International Exhibition at Paris.
22. Terrible storm in America; 400 dwellings unroofed at Philadelphia.
25. Attempt to assassinate the King of Spain.
29. Lord Dufferin arrived at Belfast on his return from Canada after filling the post of Governor-General for six years.
30. The Cabinet decided to send another Envoy to the Ameer of Cabul.
—. The directors of the Glasgow Bank committed for trial.

Nov. 1. Dedication of the new bells of St. Paul's Cathedral.

NECROLOGICAL TABLE

OF DISTINGUISHED AND NOTABLE PERSONS WHO DIED BETWEEN NOVEMBER, 1877, AND NOVEMBER, 1878.

1877.		Age
Nov.	8. AMELIE, Queen Dowager of Saxony; at Dresden	76
	—. BRION, Gustave, artist; at Paris	53
	16. VON LITTROW, Karl Ludwig; astronomer; at Venice	66
	22. GUMÆLIUS, Gustaf Vilhelm, Swedish poet; at Orebro	88
Dec.	15. WORNUM, Ralph N., Keeper and Secretary of the National Gallery; at Belsize Square, Hampstead	64
	17. RYDQVIST, Johan Erik, Swedish philologist; at Stockholm	76
	24. WRIGHT, Thomas, F.S.A., antiquarian; at Chelsea	66
	—. CLERKE, Ven. Charles C., D.D., Archdeacon of Oxford; at Christchurch	79
	27. HAMILTON, Thomas, publisher; at Clapham Common.	95
1878.		
Jan.	2. CASWALL, Rev. Edward, M.A., Priest of the Oratory, (formerly an Anglican clergyman); at Brompton	63
	4. MOZLEY, Rev. J. B., D.D., Regius Professor of Divinity and Canon of Christ Church, Oxford; at Old Shoreham	64
	—. WOLLASTON, T. Vernon, M.A., F.L.S., Entomologist; at Teignmouth	55
	5. DELLA MARMORA, General, Commander of the Italian Contingent in the Crimean War; at Florence	74
	7. RASPAIL, Francis Vincent, politician and physiologist; at Paris	84
	9. VICTOR EMANUEL, King of Italy; at Rome	58
	11. BULGARIS, M., ex-Premier of Greece, and leader of the Conservative Party; at Athens	77
	15. STIRLING-MAXWELL, Sir William, Kt., M.P. for Perthshire, Chancellor of Glasgow University, author; at Venice	60
	19. HOFMANN, J. J., Japanese scholar; at Leyden	73
	—. BECQUEREL, Antoine Céza, phiysicist; at Paris	89
	25. DORAN, John, LL.D., F.SA., author, and late editor of "Notes and Queries;" at Lansdowne Road, Notting Hill	70
	26. WILLIAMS, Rev. George, B.D., late Senior Fellow of King's College, Cambridge; at Ringwood	63
	27. CREASY, Sir Edward, historian, formerly Chief Justice of Ceylon; at Cecil Street, Strand	66
Feb.	1. CRUICKSHANK, George, artist and caricaturist; at 263, Hampstead Road	86
	5. SWABEY, Rev. Henry, M.A., Secretary of the Society for Promoting Christian Knowledge; at Gloucester Place	51
	7. PIUS IX, Pope; at Rome	86
	8. PICKERING, Basil Montagu, publisher; at 196, Piccadilly	42
	—. FRIES, Elias, Swedish botanist; at Upsala	83
	11. PRINSEP, Henry T., late member of the Indian Council and author of works on Indian history and finance; at Freshwater, Isle of Wight	85
	12. DUFF, Rev. Alex., D.D., LL.D., Indian Missionary, Professor of Theology, Free Church College, Edinburgh; at Sidmouth	72

		Age
Feb.	13. CHITTY, Thomas, lawyer, author of legal works; at Lancaster Gate	76
	19. DAUBIGNY, C. F., landscape painter; at Paris	61
	21. BAKER, Rev. R. G., M.A., Prebendary of St. Paul's, and Vicar of Fulham, 1834—1871; at Fulham	89
	—. WARTER, Rev. John Wood, B.D., Editor of "Southey's Remains;" at Worthing	73
	24. BATHURST, Earl; at 38, Half Moon Street	87
	26. SECCHI, Angelo, Jesuit, Professor of Astronomy, and Director of the Observatory at the Collegio Romano; at Rome	59
	28. ALZOG, Johann, Roman Catholic historian; at Freiburg	69
March	1. BRIGHT, Richard, M.P. for East Somerset; at Tring	56
	3. BONOMI, Joseph, Egyptologist, Curator of Soane's Museum; at Wimbledon	82
	8. FRANCIS CHARLES, Archduke, father of the Emperor of Austria.	
	12. FRISWELL, James Hains, essayist, Editor of the "Publisher's Circular;" at Bexley Heath	52
	—. GIBSON-CRAIG, Sir W. G., Bart., Lord Clerk Register of Scotland; at Riccarton	80
	19. RAVENSWORTH, Earl of, translator of Horace and Virgil; at Newcastle	81
	27. SCOTT, Sir Gilbert, R.A., architect; at Courtfield House, Kensington	66
April	9. JENKYNS, Rev. Henry, D.D., Professor of Divinity and Canon of Durham; at Southampton	82
	10. LUCIEN MURAT, Prince, last surviving son of Joachim Murat, King of Naples; at Paris	75
	11. SELWYN, Right Rev. George Augustus, D.D., Bishop of Lichfield, First Bishop of New Zealand; at Lichfield	69
May	2. GOLDSMID, Sir Francis, M.P., Q.C. for Reading, the first Jew who was made a Q.C.; at St. Thomas's Hospital	70
	8. CARTER, John, F.S.A., Alderman for Cornhill Ward; at Stamford Hill	
	9. MAIN, Rev. Robert, M.A., F.R.S., Radcliffe Observer; at Oxford	69
	10. GOULBURN, Frederick, C.B., Chairman of Her Majesty's Board of Customs	60
	15. GREY, Sir William, K.C.S.I., formerly Lieutenant-Governor of Bengal, and late Governor of Jamaica; at Torquay	60
	26. GREGG, Right Rev. John, D.D., Bishop of Cork; at Cork	79
	—. CARRUTHERS, Robert, LL.D., for 50 years editor of the "Inverness Courier," author of a Life of Pope; at Inverness	79
	28. RUSSELL, Earl, K.G., statesman and author; at Richmond	86
	31. GURNEY, Right Hon. Russell, Q.C., M.P. for Southampton, Recorder of London; at Kensington Palace Gardens	74
June	4. PACKE, Rev. Christopher, Minor Canon of St. Paul's Cathedral since 1817, and Priest in Ordinary to the Sovereign since 1821; at Ruislip	88
	11. BRYANT, William Culling, poet; at Roslyn, New York	84
	12. GEORGE V, ex-King of Hanover and Duke of Cumberland; at Paris	59
	15. HARDY, Sir Thomas Duffus, F.S.A., Deputy Keeper of the Public Records; at Maida Vale	74
	22. MCBEAN, W., V.C., General, entered the Army as junior drummer; at Woolwich	

		Age
June	23. BACK, Sir George, D.C.L., F.R.S., Admiral, Arctic Explorer; at Gloucester Place	81
	24. MATHEWS, Charles, comedian; at Manchester	74
	26. MERCEDES, Queen of Spain; at Madrid	18
July	1. WINKWORTH, Catherine, translator of the "Lyra Germanica;" at Mormetier, Savoy	
	2. BAZIN, François, composer; at Paris	59
	5. MARTIN, Rev. Samuel, Minister of Westminster Chapel; at Belgrave Road	61
	20. WHITE, William Foster, Treasurer of St. Bartholomew's and Christ's Hospitals; at Clapham	
	21. SAUNDERS, Augustus P., D.D., F.R.S., Dean of Peterborough; at Peterborough	77
	23. YELVERTON, Sir Hastings R., K.C.B., Admiral, Ex-Senior Naval Lord of the Admiralty; at Bath	70
	26. WILKINSON, Eason, M.D., President of the British Medical Association; at Manchester	64
	31. BENISCH, Abraham, Hebrew scholar, translator of the Hebrew Scriptures, as accepted by orthodox Jews, into English; at Hornsey	67
Aug.	1. FRANCHI, Cardinal, Pontifical Secretary of State; at Rome	59
	4. DE STANE, Baron William M., Arabic scholar; at Belfast	77
	13. GILFILLAN, Rev. George, author; at Brechin	
	21. CHRISTINA, Queen Dowager of Spain; at Havre	72
	22. MORTIMER, Mrs. Favell Lee, author of "the Peep of Day"; at Runcorn	76
	23. LINDBLAD, Adolf Frederik, Swedish composer; at Lofvingsborg	77
	25. COLLS, Benjamin, Chairman of the City Lands Committee of the Corporation of London; at Bray, near Dublin	63
Sept.	1. LAUDERDALE, Earl of, Hereditary Grand Standard Bearer of Scotland; at Thirlstane	75
	2. PAYNE, George, sportsman; at John Street, Berkeley Square	75
	13. JACKSON, Rev. W., D.D., Provost of Queen's College, Oxford; at Penrith	
	15. ULLESPERGER, John Baptist, M.D., physician; at Munich	80
	20. BIDDER, G. P., F.R.S., late President Inst. C.E.; at Dartmouth	71
	21. WILLIS, Robert, M.D., physician; at Barnes	80
	22. GRIFFITH, Sir R., late Chairman of the Irish Board of Works; at Dublin	94
	23. PENN, John, marine engineer; at Lee	73
	—. CHALK, Sir James, Secretary of the Ecclesiastical Commission, 1850–71; at Warwick Square	75
	25. MCDONNELL, Thomas, Q.C., Father of the Irish Bar; at Belfast	84
	26. PETERMANN, A., geographer; at Gotha	58
	—. MULLER, J., LL.D., Professor of Theology; at Halle	77
	28. BIDDULPH, General Sir T. M., Keeper of Her Majesty's Privy Purse; at Balmoral	69
Oct.	1. KEOGH, Right Hon. W., Irish Judge; at Bingen	62
	2. KING OF BURMAH; at Mandalay	
	—. BALFOUR, Mrs. Clara L., lecturer; at Croydon	70
	5. GRANT, Sir Francis, President of the Royal Academy; at Melton Mowbray	75
	—. CHELMSFORD, Lord, ex-Lord Chancellor; at Eaton Square	85

		Age.
Oct.	7. WHALLEY, G. H., M.P. for Peterborough; at Llangollen	65
	11. DUPANLOUP, Mgr., Bishop of Orleans	76
	15. MACKENZIE, Right Rev. Henry, D.D., late Bishop Suffragan of Nottingham; at Lincoln	70
	17. RAINES, Rev. F. R., M.A., antiquarian; at Scarborough	70
	18. LAING, David, LL.D., librarian of the Signet Library; at Portobello	86
	21. JOHNSTONE, James, proprietor of the *Standard* newspaper; at Coulsdon	
	24. CULLEN, Paul, Cardinal Archbishop; at Dublin	78
	—. CHARLES, DUKE OF GLUCKSBURG; at Copenhagen	65
	26. KYNASTON, Herbert, D.D., late High Master of St. Paul's School; at Alfred Place, Kensington	69
	31. GARNIER-PAGES, Louis, politician; at Paris	75

NOTE.—The Necrological Table here given contains the names of 107 distinguished persons, of various countries, who died during the twelve months from November, 1877, to November, 1878. Of this number, 23, or 21 per cent., died at the age of 80 or more, and of these, two were upwards of 90.

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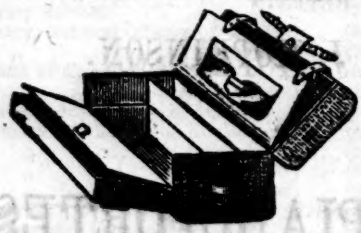

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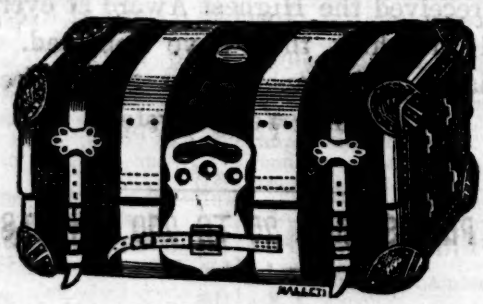

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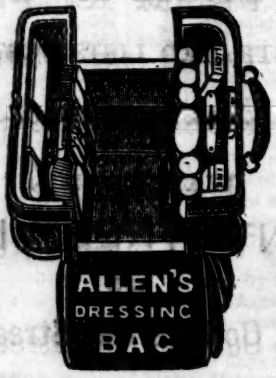

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AND ALL STOMACH COMPLAINTS,

AND, AS A NATURAL CONSEQUENCE, A

PURIFIER OF THE BLOOD & A SWEETENER OF THE WHOLE SYSTEM.

INDIGESTION is a weakness or want of power of the digestive juices in the stomach to convert what we eat and drink into healthy matter, for the proper nourishment of the whole system. It is caused by everything which weakens the system in general, or the stomach in particular. From it proceed nearly all the diseases to which we are liable; for it is very certain that if we could always keep the stomach right we should only die by old age or accident. Indigestion produces a great variety of unpleasant sensations; amongst the most prominent of its miserable effects are a want of, or an inordinate appetite, sometimes attended with a constant craving for drink, a distension or feeling of enlargement of the stomach, flatulency, heartburn, pain in the stomach, acidity, unpleasant taste in the mouth, perhaps sickness, rumbling noise in the bowels; in some cases of depraved digestion there is nearly a complete disrelish for food, but still the appetite is not greatly impaired, as at the stated period of meals persons so afflicted can eat heartily, although without much gratification; a long train of nervous symptoms are also frequent attendants, general debility, great languidness, and incapacity for exertion. The minds of persons so afflicted frequently become irritable and desponding, and great anxiety is observable in the countenance, they appear thoughtful, melancholy, and dejected, under great apprehension of some imaginary danger, will start at any unexpected noise or occurrence, and become so agitated that they require some time to calm and collect themselves; yet for all this the mind is exhilarated without much difficulty; pleasing events, society, will for a time dissipate all appearance of disease; but the excitement produced by an agreeable change vanishes soon after the cause has gone by. Other symptoms are, violent palpitations, restlessness, the sleep disturbed by frightful dreams and startings, and affording little or no refreshment; occasionally there is much moaning, with a sense of weight and oppression upon the chest, nightmare, &c.

It is almost impossible to enumerate all the symptoms of this first invader upon the constitution, as in a hundred cases of *Indigestion* there will probably be something peculiar to each; but be they what they may, they are all occasioned by the food becoming a burden rather than a support to the stomach; and in all its stages the medicine most wanted that is

OBSERVATIONS ON INDIGESTION.

which will afford speedy and effectual assistance to the digestive organs, and give energy to the nervous and muscular systems—nothing can more speedily or with more certainty effect so desirable an object than *Norton's Extract of Camomile Flowers*. The herb has from time immemorial been highly esteemed in England as a grateful anodyne, imparting an aromatic bitter to the taste, and a pleasing degree of warmth and strength to the stomach, and in all cases of indigestion, gout in the stomach, windy colic, and general weakness, it has for ages been strongly recommended by the most eminent practitioners as very useful and beneficial. The great, indeed only, objection to its use has been the large quantity of water which it takes to dissolve a small part of the flowers and which must be taken with it into the stomach. It requires a quarter of a pint of boiling water to dissolve the soluble portion of one drachm of Camomile Flowers; and when one or even two ounces may be taken with advantage, it must at once be seen how impossible it is to take a proper dose of this wholesome herb in the form of tea: and the only reason why it has not long since been placed the very first in rank of all restorative medicines is, that in taking it the stomach has always been loaded with water which tends in a great measure to counteract, and very frequently wholly to destroy the effect. It must be evident that loading a weak stomach with a large quantity of water, merely for the purpose of conveying into it a small quantity of medicine, must be injurious; and that the medicine must possess powerful renovating properties only to counteract the bad effects likely to be produced by the water. Generally speaking, this has been the case with Camomile Flowers, a herb possessing the highest restorative qualities, and when properly taken, decidedly the most speedy restorer, and the most certain preserver of health.

NORTON'S CAMOMILE PILLS are prepared by a peculiar process accidentally discovered, and known only to the proprietor, and which he firmly believes to be one of the most valuable modern discoveries in medicine, by which all the essential and extractive matter of more than an ounce of the flowers is concentrated in four moderate-sized pills. Experience has afforded the most ample proof that they possess all the fine aromatic and stomachic properties for which the herb has been esteemed; and, as they are taken into the stomach unencumbered by any diluting or indigestible substance, in the same degree has their benefit been more immediate and decided. Mild in their operation and pleasant in their effect, they may be taken at any age, and under any circumstances, without danger or inconvenience. A person exposed to cold and wet a whole day or night could not possibly receive any injury from taking them, but on the contrary, they would effectually prevent a cold being taken. After a long acquaintance with and observance of the medicinal properties of *Norton's Camomile Pills*, it is only doing them justice to say, that they are really the most valuable of all TONIC MEDICINES. By the word tonic is meant a medicine which gives strength to the stomach sufficient to digest in proper quantities all wholesome food, which increases the power of every nerve and muscle of the human body, or in other words, invigorates the nervous and muscular systems. The solidity or firmness of the whole tissue of the body, which so quickly follows the use of *Norton's Camomile Pills*, their certain and speedy effect in repairing the partial dilapidations from time or intemperance, and their lasting salutary influence on the whole frame, is most convincing, that in the smallest compass is contained the largest quantity of the tonic principle, of so peculiar a nature as to pervade the whole system, through which it diffuses health and strength sufficient to resist the formation of disease, and also to fortify the constitution against contagion; as such, their general use is strongly recommended as a preventative during the prevalence of malignant fever or other infectious diseases, and to persons attending sick-rooms they are invaluable, as in no one instance have they ever failed in preventing the taking of illness, even under the most trying circumstances.

As *Norton's Camomile Pills* are particularly recommended for all stomach complaints or indigestion, it will probably be expected that some advice will be given respecting diet, though after all that has been written upon the subject, after the publication of volume upon volume, after the country has, as it were, been inundated with practical essays on diet as a means of prolonging life, it would be unnecessary to say more, did we not feel it our duty to make the humble endeavour of inducing the public to regard them not, but to adopt that course which is dictated by nature, by reason, and by common sense. Those persons who study the wholesomes, and are governed by the opinion of writers on diet, are uniformly both unhealthy in body and weak in mind. There can be no doubt that the palate is designed to inform us what is proper for the stomach, and of course that must best instruct us what food to take and what to avoid: we want no other adviser. Nothing can be more clear than those articles which are agreeable to the taste were by nature intended for our

OBSERVATIONS ON INDIGESTION.

food and sustenance, whether liquid or solid, foreign or of native production; if they are pure and unadulterated, no harm need be dreaded by their use; they will only injure by abuse. Consequently whatever the palate approves, eat and drink always in moderation, but never in excess; keeping in mind that the first process of digestion is performed in the mouth, the second in the stomach; and that, in order that the stomach may be able to do its work properly, it is requisite the first process should be well performed; this consists in masticating or chewing the solid food, so as to break down and separate the fibres and small substances of meat and vegetable, mixing them well, and blending the whole together before they are swallowed; and it is particularly urged upon all to take plenty of time to their meals and never eat in haste. If you conform to this short and simple, but comprehensive advice, and find that there are various things which others eat and drink with pleasure and without inconvenience, and which would be pleasant to yourself only that they disagree, you may at once conclude that the fault is in the stomach, that it does not possess the power which it ought to do, that it wants assistance, and the sooner that assistance is afforded the better. A very short trial of medicine will best prove how soon it will put the stomach in a condition to perform with ease all the work which nature intended for it. By its use you will soon be able to enjoy, in moderation, whatever is agreeable to the taste, and unable to name one individual article of food which disagrees with or sits unpleasantly on the stomach. Never forget that a small meal well digested affords more nourishment to the system than a large one, even of the same food when digested imperfectly. Let the dish be ever so delicious, ever so enticing, a variety offered, the bottle ever so enchanting, never forget that temperance tends to preserve health, and that health is the soul of enjoyment. But should an impropriety be at any time, or ever so often committed, by which the stomach becomes overloaded or disordered, render it immediate aid by taking a dose of *Norton's Camomile Pills*, which will so promptly assist in carrying off the burden thus imposed upon it that all will soon be right again.

It is most certainly true that every person in his lifetime consumes a quantity of noxious matter, which if taken at one meal would be fatal; it is these small quantities of noxious matter, which are introduced into our food, either by accident or wilful adulteration, which we find so often upset the stomach, and not unfrequently lay the foundation of illness, and perhaps final ruination to health. To preserve the constitution, it should be our constant care, if possible, to counteract the effect of these small quantities of unwholesome matter; and whenever, in that way, an enemy to the constitution finds its way into the stomach, a friend should immediately be sent after it, which would prevent its mischievous effects, and expel it altogether; no better friend can be found—no, none which will perform the task with greater certainty, than NORTON'S CAMOMILE PILLS. And let it be observed that the longer this medicine is taken the less it will be wanted, and it can in no case become habitual, as its entire action is to give energy and force to the stomach, which is the spring of life, the source from which the whole frame draws its succour and support. After an excess of eating or drinking, and upon every occasion of the general health being at all disturbed, these Pills should be immediately taken, as they will stop and eradicate disease at its commencement. Indeed, it is most confidently asserted, that by the timely use of this medicine only, and a common degree of caution, any person may enjoy all the comfort within his reach, may pass through life without an illness, and with the certainty of attaining a healthy OLD AGE.

On account of their volatile properties, they must be kept in bottles; and if closely corked their qualities are neither impaired by time nor injured by any change of climate whatever. Price 13½*d.* and 2*s.* 9*d.* each, with full directions. The large bottle contains the quantity of three small ones, or PILLS equal to fourteen ounces of CAMOMILE FLOWERS.

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OBSERVATIONS ON INDIGESTION.

which will afford speedy and effectual assistance to the digestive organs, and give energy to the nervous and muscular systems—nothing can more speedily or with more certainty effect so desirable an object than *Norton's Extract of Camomile Flowers*. The herb has from time immemorial been highly esteemed in England as a grateful anodyne, imparting an aromatic bitter to the taste, and a pleasing degree of warmth and strength to the stomach, and in all cases of indigestion, gout in the stomach, windy colic, and general weakness, it has for ages been strongly recommended by the most eminent practitioners as very useful and beneficial. The great, indeed only, objection to its use has been the large quantity of water which it takes to dissolve a small part of the flowers and which must be taken with it into the stomach. It requires a quarter of a pint of boiling water to dissolve the soluble portion of one drachm of Camomile Flowers; and when one or even two ounces may be taken with advantage, it must at once be seen how impossible it is to take a proper dose of this wholesome herb in the form of tea: and the only reason why it has not long since been placed the very first in rank of all restorative medicines is, that in taking it the stomach has always been loaded with water which tends in a great measure to counteract, and very frequently wholly to destroy the effect. It must be evident that loading a weak stomach with a large quantity of water, merely for the purpose of conveying into it a small quantity of medicine, must be injurious; and that the medicine must possess powerful renovating properties only to counteract the bad effects likely to be produced by the water. Generally speaking, this has been the case with Camomile Flowers, a herb possessing the highest restorative qualities, and when properly taken, decidedly the most speedy restorer, and the most certain preserver of health.

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As *Norton's Camomile Pills* are particularly recommended for all stomach complaints or indigestion, it will probably be expected that some advice will be given respecting diet, though after all that has been written upon the subject, after the publication of volume upon volume, after the country has, as it were, been inundated with practical essays on diet as a means of prolonging life, it would be unnecessary to say more, did we not feel it our duty to make the humble endeavour of inducing the public to regard them not, but to adopt that course which is dictated by nature, by reason, and by common sense. Those persons who study the wholesomes, and are governed by the opinion of writers on diet, are uniformly both unhealthy in body and weak in mind. There can be no doubt that the palate is designed to inform us what is proper for the stomach, and of course that must best instruct us what food to take and what to avoid: we want no other adviser. Nothing can be more clear than those articles which are agreeable to the taste were by nature intended for our

OBSERVATIONS ON INDIGESTION.

food and sustenance, whether liquid or solid, foreign or of native production; if they are pure and unadulterated, no harm need be dreaded by their use; they will only injure by abuse. Consequently whatever the palate approves, eat and drink always in moderation, but never in excess; keeping in mind that the first process of digestion is performed in the mouth, the second in the stomach; and that, in order that the stomach may be able to do its work properly, it is requisite the first process should be well performed; this consists in masticating or chewing the solid food, so as to break down and separate the fibres and small substances of meat and vegetable, mixing them well, and blending the whole together before they are swallowed; and it is particularly urged upon all to take plenty of time to their meals and never eat in haste. If you conform to this short and simple, but comprehensive advice, and find that there are various things which others eat and drink with pleasure and without inconvenience, and which would be pleasant to yourself only that they disagree, you may at once conclude that the fault is in the stomach, that it does not possess the power which it ought to do, that it wants assistance, and the sooner that assistance is afforded the better. A very short trial of medicine will best prove how soon it will put the stomach in a condition to perform with ease all the work which nature intended for it. By its use you will soon be able to enjoy, in moderation, whatever is agreeable to the taste, and unable to name one individual article of food which disagrees with or sits unpleasantly on the stomach. Never forget that a small meal well digested affords more nourishment to the system than a large one, even of the same food when digested imperfectly. Let the dish be ever so delicious, ever so enticing, a variety offered, the bottle ever so enchanting, never forget that temperance tends to preserve health, and that health is the soul of enjoyment. But should an impropriety be at any time, or ever so often committed, by which the stomach becomes overloaded or disordered, render it immediate aid by taking a dose of *Norton's Camomile Pills*, which will so promptly assist in carrying off the burden thus imposed upon it that all will soon be right again.

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FIRE DEPARTMENT.

Fire Premiums for the Year	£788,059 2 11
Being an increase of £65,601 upon the preceding year.	
Losses	£427,477 19 10

LIFE DEPARTMENT.

Income from Premiums, after deducting Re-Assurances	£245,058 6 9

BONUSES DECLARED at the last two Divisions of Profits:—£1 10*s.* per cent. per annum on sum Assured, upon all Policies entitled to participate.

FUNDS.

After providing for payment of the Dividend and Bonus, the Funds of the Company will stand as follows:—

Capital paid-up	£289,545 0 0
Fire Fund	400,000 0 0
Reserve Fund	750,000 0 0
Balance of Profit and Loss	71,695 15 0
Life Funds	2,246,802 4 7
	£3,758,042 19 7

GROWTH OF FUNDS.

1862	£881,304
1867	1,409,741
1872	2,320,940
1877	3,758,042

Extract from Auditors' Report.

"We have examined and counted every Security, and have found all correct and in perfect order, and that the present aggregate market value thereof is in excess of the amounts in the said Balance-Sheets."

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DIGBY JOHNSON, Sub-Manager.

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VALUATION BALANCE SHEET, 31st DECEMBER, 1875.

Assurance Fund (accumulated solely from Premiums) ..	£675,883 3 8
Net Liability under Assurance and Annuity transactions..	337,366 16 0
Surplus available for future Bonus and Expenses	£338,516 7 8

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Solicitors.—MESSRS. LEE, BOLTON, and LEE, No. 2, Broad Sanctuary, Westminster.
Auditors.—CHARLES BARBER, ESQ. GEORGE J. BIDDULPH, ESQ. ROBERT J. LODGE, ESQ. REV. ALEXANDER WILSON, M.A.
Bankers.—MESSRS. COUTTS and CO. *Consulting Actuary.*—FREDERICK HENDRIKS, ESQ.
Physician.—DR. STONE, 14, Dean's Yard. *Actuary.*—STEWART HELDER, ESQ.
Secretary.—MATTHEW HODGSON, ESQ.

Total Funds .. .. £2,497,637.
Total Annual Income .. .. £298,345.

NO AGENTS EMPLOYED, AND NO COMMISSION PAID.

Reduced Premiums.—Assurances may be effected upon payment of four-fifths of the rates chargeable according to the Society's Table, subject to *certain conditions* fully set forth and explained in the Prospectus.

Claims.—The total amount of Claims paid upon death from the commencement of the Society to 1st June, 1878, was **£1,607,860.**

Bonus.—The whole available Bonus is the sole property of Life Assurers; no part whatever is taken from it to be shared amongst Proprietors. At the end of every fifth year, profits are equitably apportioned amongst existing Life Assurances. By means of Bonus, many of the earlier Life Assurances have been relieved altogether from the payment of Annual Premiums, and additions in almost every case have been made to the sums Assured; £343,140 was divided amongst Life Assurances at the declaration of Bonus on 1st June 1876. Next Bonus due 1st June, 1881.

Assurers have the privilege, at the time of making an Assurance, of selecting the mode in which the Bonus, whenever due, shall be applied, viz.—in an immediate Cash payment, or to the reduction of the Annual Premium, or to the increase of the Capital sum assured.

ASSURANCES may be effected on LIVES, SURVIVORSHIPS, &c., &c., as stated in the Society's Prospectus, to any amount not exceeding £7,500.

This Society is strictly confined to the Clergy of the Church of England and of the Episcopal Church of Scotland, their Wives and Families, and the near relations of themselves and Wives.

Prospectuses, Bonus Accounts, Forms of Proposal, &c., may be had at the Offices, on personal application, or by letter.

1 & 2, *Broad Sanctuary, Westminster.*

Eagle Insurance Company,

(FOR LIVES ONLY,)

79, PALL MALL, LONDON, S.W.

(ESTABLISHED 1807.)

DIRECTORS.

GEORGE RUSSELL, Esq., *Chairman.*
CHARLES JELLICOE, Esq., F.R.G.S., *Deputy-Chairman.*
THOMAS ALLEN, Esq.
CHARLES BISCHOFF, Esq.
THOMAS BODDINGTON, Esq.
RIGHT HON. SIR JAMES FERGUSSON, Bart., K.C.M.G.
HON. THOS. F. FREMANTLE, M.P.
WILLIAM A. GUY, M.B., F.R.S.
RALPH LUDLOW LOPES, Esq.
HENRY PAULL, Esq.
SIR PHILIP ROSE, Bart.

ACTUARY AND SECRETARY.

GEORGE HUMPHREYS, Esq., M.A.

	£
Accumulated Funds	**3,083,281**
Also a Subscribed Capital of more than	**1,500,000**

Expenses of Management barely exceed Three per Cent. of the Gross Income.

Annual Reports, Prospectuses, and Forms, may be had, or will be sent, Post-free, on application at the Office, or to any of the Company's Agents.

THE ECONOMIC
LIFE ASSURANCE SOCIETY,

No. 6, NEW BRIDGE STREET, BLACKFRIARS, LONDON, E.C.

ESTABLISHED 1823.

Empowered by Act of Parliament, 3 William IV.

DIRECTORS.

HENRY BARNETT, Esq., *Chairman.*

The Rt. Hon. E. PLEYDELL BOUVERIE, *Deputy-Chairman.*

CHARLES ARTHUR BARCLAY, Esq.
MICHAEL BIDDULPH, Esq., M.P.
EDWARD CHARRINGTON, Esq.
JOHN HARMAN, Esq.
C. H. W. à COURT REPINGTON, Esq.
GEORGE KETTILBY RICKARDS, Esq.
ALFRED SARTORIS, Esq.
AUGUSTUS KEPPEL STEPHENSON Esq.
Rt. Hon. LORD SUDELEY.
RICHARD TAYLOR, Esq.

AUDITORS.

ALFRED BUCKLEY, Esq.
HUGH MACKAY GORDON, Esq.
JOHN HOWELL, Esq.
JOHN GILLIAM STILWELL, Esq.

Physician.—L. T. CUMBERBATCH, Esq., M.D., 25, Cadogan Place, Belgrave Square, S.W.

Surgeon.—GEO. D. POLLOCK, Esq., F.R.C.S., 36, Grosvenor Street, W.

Solicitor.—CHARLES WARING YOUNG, Esq., 12, Essex Street, Strand.

Secretary.—JOHN RALPH GRIMES, Esq.

Actuary.—RICHARD CHARLES FISHER, Esq.

ADVANTAGES OFFERED BY THE SOCIETY:—

The **lowest** rates of Premium on the **Mutual System**, for young and middle-aged lives, with early participation in Profits.

Security—Accumulated Fund	£3,272,219
Annual Income	363,763
Claims paid, with Bonus Additions	5,507,150
Bonuses declared	2,858,415

Bonus.—The Society being on the **mutual** principle, the Assured share the **whole of the Profits.** Policies effected before 31st December of each year, receive a full year's Bonus for the year of entry on their first participating.

Table of Annual Premiums required for an Assurance of £100 *for the whole Term of Life, with Participation in Profits.*

	£	s.	d.		£	s.	d.
20	1	14	7	35	2	10	11
25	1	19	0	40	2	19	9
30	2	4	3	45	3	11	9

Assurances granted to the extent of £10,000 on a single life.

Prospectuses, Statement of Accounts, and full particulars may be obtained on application to

JOHN RALPH GRIMES, *Secretary.*

EQUITABLE LIFE ASSURANCE SOCIETY,

OPPOSITE THE MANSION HOUSE, LONDON.

Founded A.D. 1762.

THE OLDEST LIFE OFFICE ON THE MUTUAL PRINCIPLE IN THE WORLD.

BONUS TABLE FOR 1879.

TABLE showing the Amount payable under a Policy for **£1,000** (with its additions), in the event of its becoming a claim after payment of the premium due in the year **1879.**

Policies effected since December 31, 1816.	Sum payable with Additions.	
	£	s.
From 1st Jan. 1817 to 24th April 1817....	2890	0
„ 24th April 1817 to 16th April 1818....	2810	0
„ 18th April 1818 to 4th Feb. 1819....	2730	0
„ 5th Feb. 1819 to 3rd Jan. 1820....	2650	0
„ 7th Jan. 1820 to 22nd Dec. 1820....	2570	0
„ 23rd Dec. 1820 to 30th Nov. 1821....	2490	0
„ 1st Dec. 1821 to 7th Mar. 1823....	2410	0
„ 7th Mar. 1823 to 24th May 1824....	2330	0
„ 25th May 1824 to 8th Mar. 1825....	2250	0
„ 9th Mar. 1825 to 3rd Nov. 1826....	2195	0
„ 7th Nov. 1826 to 15th July 1828....	2140	0
„ 21st July 1828 to 1st Mar. 1830....	2085	0
„ 3rd Mar. 1830 to 24th Nov. 1831....	2030	0
„ 24th Nov. 1831 to 1st Aug. 1833....	1975	0
„ 1st Aug. 1833 to 18th June 1835....	1920	0
„ 19th June 1835 to 21st July 1837....	1865	0
„ 21st July 1837 to 22nd Jan. 1839....	1810	0
„ 24th Jan. 1839 to 10th Dec. 1840....	1755	0
„ 15th Dec. 1840 to 2nd Nov. 1842....	1700	0
„ 12th Nov. 1842 to 18th June 1845....	1665	0
„ 19th June 1845 to 2nd Mar. 1847....	1630	0
„ 3rd Mar. 1847 to 14th Nov. 1848....	1595	0
„ 14th Nov. 1848 to 19th Nov. 1850....	1560	0
„ 19th Nov. 1850 to 26th July 1853....	1525	0
„ 26th July 1853 to 31st Dec. 1855....	1490	0
„ 1st Jan. 1856 to 31st Dec. 1856....	1455	0
„ 1st Jan. 1857 to 31st Dec. 1857....	1420	0
„ 1st Jan. 1858 to 31st Dec. 1858....	1385	0
„ 1st Jan. 1859 to 31st Dec. 1859....	1350	0
„ 1st Jan. 1860 to 31st Dec. 1860....	1332	10
„ 1st Jan. 1861 to 31st Dec. 1861....	1315	0
„ 1st Jan. 1862 to 31st Dec. 1862....	1297	10
„ 1st Jan. 1863 to 31st Dec. 1863....	1280	0
„ 1st Jan. 1864 to 31st Dec. 1864....	1262	10
„ 1st Jan. 1865 to 31st Dec. 1865....	1227	10
„ 1st Jan. 1866 to 31st Dec. 1866 ...	1192	10
„ 1st Jan. 1867 to 31st Dec. 1867....	1157	10
„ 1st Jan. 1868 to 31st Dec. 1868....	1122	10
„ 1st Jan. 1869 to 31st Dec. 1869....	1087	10
„ 1st Jan. 1870 to 31st Dec. 1870....	1070	0
„ 1st Jan. 1871 to 31st Dec. 1871....	1052	10
„ 1st Jan. 1872 to 31st Dec. 1872....	1035	0
„ 1st Jan. 1873 to 31st Dec. 1873....	1017	10

The "Equitable" has never allowed COMMISSION.

J. WARE STEPHENSON, *Actuary.*

GUARDIAN

Fire and Life Assurance Company.

HEAD OFFICE:

11, LOMBARD STREET, LONDON, E.C.

Established 1821, *and Empowered by Special Acts of Parliament.*

Subscribed Capital	**£2,000,000**
Capital paid up	**1,000,000**
Total Invested Funds, upwards of	**2,894,000**
Total Income, upwards of	**465,000**

DIRECTORS.

CHAIRMAN—RICHARD M. HARVEY, ESQ.

DEPUTY-CHAIRMAN—AUGUSTUS PREVOST, ESQ.

HENRY HULSE BERENS, ESQ.
HENRY BONHAM-CARTER, ESQ.
CHARLES WILLIAM CURTIS, ESQ.
CHARLES F. DEVAS, ESQ.
SIR WALTER R. FARQUHAR, BART.
ALBAN G. H. GIBBS, ESQ.
JAMES GOODSON, ESQ.
ARCHIBALD HAMILTON, ESQ.
THOMSON HANKEY, ESQ., M.P.
RIGHT HON. JOHN G. HUBBARD, M.P.
FREDERICK HALSEY JANSON, ESQ.
G. J. SHAW-LEFEVRE, ESQ.
BEAUMONT W. LUBBOCK, ESQ.
JOHN B. MARTIN, ESQ.
HENRY JOHN NORMAN, ESQ.
WILLIAM STEVEN, ESQ.
JOHN G. TALBOT, ESQ., M.P.
HENRY VIGNE, ESQ.

AUDITORS.

HERBERT G. H. NORMAN, ESQ.
CORNELIUS PAINE, ESQ.
HENRY SYKES THORNTON, ESQ.
NOEL-WHITING, ESQ.

Manager of the Fire Department.—F. J. MARSDEN, ESQ.

Actuary and Secretary.—T. G. C. BROWNE, ESQ.

Physician.—J. RUSSELL REYNOLDS, ESQ., M.D., F.R.S., 38, Grosvenor Street, W.

Solicitors.—Messrs. PARKIN & PAGDEN, 5, New Square, Lincoln's Inn.

Surveyors.—{ JOSEPH JENNINGS, ESQ., Langham Street, Cavendish Square.
{ Messrs. DRIVER (Valuers for Landed Securities), 4, Whitehall.

Bankers.—{ Messrs. MARTIN & Co., 68, Lombard Street.
{ Messrs. COUTTS & Co., 59, Strand.

LIFE DEPARTMENT.

The Quinquennial Valuation to Christmas, 1874, was made on the basis of the Institute of Actuaries' (H^M) Table of Mortality and 3 per cent. interest. The Valuation was strictly a net premium one, the whole of the loading being reserved.

The amount of profit divided among 2,875 participating policies, assuring £3,002,776. was £128,000, which was equivalent to a return of 29 per cent. of the premiums received during the five years.

The Valuation Report concludes as follows:—

"The Company's Accumulated Life Reserve Fund is about £21,000 more than is required by a Net Premium Valuation according to the Institute of Actuaries' (H^M) Table of Mortality. This is equalled by very few Offices indeed, and the additional Guarantee afforded by the paid-up capital of £1,000,000 places the Guardian in a position of singular financial strength."

Life Assets (1877) - £1,465,000 | Life Income - - - £179,000.

FIRE DEPARTMENT.

Insurances effected upon Property at Home and Abroad at Moderate Rates.

Fire Assets (1877) - £355,000 | Fire Income - - £240,000

HAND-IN-HAND

FIRE AND LIFE INSURANCE SOCIETY,

NEW BRIDGE STREET, BLACKFRIARS, LONDON, E.C.

***Instituted in* 1696.—*Extended to Life Insurance*, 1836.**

DIRECTORS.

The Hon. LIONEL ASHLEY.
T. PALMER CHAPMAN, Esq.
MAJOR H. F. C. CUST, M.P.
JOHN LETTSOM ELLIOT, Esq.
Vice-Admiral Sir LEOPOLD G. HEATH, K.C.B.
ANDREW JOHNSTON, Esq.
FREDERICK LOCKER, Esq.
T. FULLER MAITLAND, Esq.
ARTHUR SPERLING, Esq.
JAMES SYDNEY STOPFORD, Esq.
THOMAS TURNER, Esq.
W. ESDAILE WINTER, Esq.

AUDITORS.

J. LETTSOM ELLIOT, Esq. CHARLES R. GURNEY HOARE, Esq.
T. A. FULLER-MAITLAND, Esq.

Bankers—Messrs. GOSLINGS & SHARPE, 19, Fleet Street.

Physician—THOMAS K. CHAMBERS, M.D.

Solicitors—Messrs. NICHOLL, MANISTY, & NICHOLL, 8, Howard Street, Strand.

Secretary—BENJAMIN BLENKINSOP, Esq.

Actuary—JAMES TERRY, Esq.

The **oldest Insurance Office** in the World.

The **only Mutual Office** in the Kingdom for both **Fire and Life.**

There being **no Shareholders, all Profits** are **divided amongst** the **Insured, the Returns** on **Policies of Five Years' standing and upwards** being, with few exceptions—

In the Fire Department, 20 per cent. of the Premium of Annual Policies.

Septennial Policies as heretofore.

In the Life Department, 55 to 65 per cent. of the Premium of Members' Policies.

No Policy Holder is subject to **any Personal Liability.**

The Directors are **willing to appoint as Agents persons of good position and character.**

31st DECEMBER, 1877.

Claims paid on Life Policies to this date	£1,404,384.
Amount of Profits returned ditto	1,035,008.
ASSETS.	
Accumulated Fund	£1,780,046.
Present Value of Life Premiums	1,524,154.
LIABILITIES.	
Present Value of Sums Insured (£4,032,390)	£1,995,331.
Present Value of Life Annuities (£7,887 per Ann. and £250 Contingent)	58,194.
Annual Income	240,316.

The Accounts of the Society may be had on application at the Office.

BENJAMIN BLENKINSOP, *Secretary.*

The Liverpool and London and Globe INSURANCE COMPANY.

ESTABLISHED 1836.

OFFICES:—1, DALE STREET, LIVERPOOL; CORNHILL, AND CHARING CROSS, LONDON.

Empowered specially by Parliament.

INVESTED FUNDS, £5,814,367 STERLING.

Trustees of Company.

Trustees Liverpool—T. BROCKLEBANK, Esq., J. HUBBACK, Esq., J. A. TOBIN, Esq., Liverpool.

Trustees London—Sir CHARLES NICHOLSON, Bart., D.C.L., WM. MACNAUGHTAN, Esq., WM. NICOL, Esq., London.

Trustees of Globe Million Fund.

Sir CHARLES NICHOLSON, Bart., D.C.L., WM. NEWMARCH, Esq., F.R.S., JOHN WILLIAM ROBINS, Esq., Sir HENRY W. TYLER, Capt. R.E., GEORGE DUNBAR WHATMAN, Esq.

DIRECTORS.

LIVERPOOL BOARD.—OFFICE: No. 1, DALE STREET.

Chairman—H. B. GILMOUR, Esq.

Deputy Chairmen—A. CASTELLAIN, Esq., and G. H. LOXDALE, Esq.

CHAS. T. BOWRING, Esq.	W. D. HOLT, Esq.	H. H. NICHOLSON, Esq.
THOS. BROCKLEBANK, Esq.	J. HUBBACK, Esq.	WILLIAM PATON, Esq.
C. J. CORBALLY, Esq.	H. LITTLEDALE, Esq.	J. ROME, Esq.
A. FLETCHER, Esq.	GEO. MELLY, Esq.	J. A. TOBIN, Esq.
ARTHUR P. FLETCHER, Esq.		

Secretary of the Company—J. M. DOVE, Esq.

Assistant Secretary—A. DUNCAN, Esq.

Auditors—PETER S. BOULT, Esq., and H. W. MEADE-KING, Esq.

Medical Referees—J. R. W. VOSE, Esq., M.D., and E. R. BICKERSTETH, Esq.

Bankers—BANK OF LIVERPOOL; UNION BANK OF LONDON.

Solicitors—Messrs. LACES, BIRD, NEWTON, and RICHARDSON.

LONDON BOARD.—OFFICES: 7, CORNHILL, AND CHARING CROSS.

Chairman—Sir CHAS. NICHOLSON, Bart., D.C.L.

Deputy-Chairman—WILLIAM NICOL, Esq.

W. PLEYDELL BOUVERIE, Esq.	Hon. SIDNEY CARR GLYN.
W. J. R. COTTON, Esq., Alderman, M.P.	R. W. GAUSSEN, Esq.
Hon. E. DRUMMOND.	W. MACNAUGHTAN, Esq.
FRED. FANNING, Esq.	G. D. WHATMAN, Esq.

Actuary and Resident Secretary—AUGUSTUS HENDRIKS, Esq.

Fire Superintendent—T. SEPTIMUS MARKS, Esq.

Medical Referees—J. R. BENNETT, Esq., M.D., A. ANDERSON, Esq., F.R.C.S.

Consulting Surgeon—Sir JAMES PAGET, Bart., F.R.S.

Bankers—THE LONDON AND COUNTY BANK; Messrs. GLYN, MILLS, CURRIE, and Co.

Solicitors—Messrs. PALMER, BULL, and FRY.

Surveyors—E. N. CLIFTON, Esq.; WM. THOMPSON, Esq.

REVENUE IN 1877.

Fire Premiums	£1,052,465
Life Premiums	£250,790

LIFE CLAIMS PAID THIRTY DAYS AFTER ADMISSION.

Agencies are established for effecting both Fire and Life Insurances, and facilitating the payment of Premiums in all parts of the World.

THE LONDON ASSURANCE.

Incorporated by Royal Charter, A.D. 1720.

FOR FIRE, LIFE, AND MARINE ASSURANCES.

No. 7, ROYAL EXCHANGE, LONDON, E.C.

BRANCH OFFICE—No. 16, CROSS ST., MANCHESTER.

EDWARD BUDD, Esq., *Governor.*
MARK WILKS COLLET, Esq., *Sub-Governor.*
WILLIAM RENNIE, Esq., *Deputy-Governor.*

DIRECTORS.

H. GOUGH ARBUTHNOT, Esq.	ROBERT GILLESPIE, Esq.	CHARLES LYALL, Esq.
ROBERT BURN BLYTH, Esq.	HOWARD GILLIAT, Esq.	Capt. R. W. PELLY, R.N.
WILLIAM T. BRAND, Esq.	HENRY GOSCHEN, Esq.	P. F. ROBERTSON, Esq.
Major-General H. P. BURN.	EDWIN GOWER, Esq.	ROBERT RYRIE, Esq.
GEORGE W. CAMPBELL, Esq.	A. C. GUTHRIE, Esq.	DAVID P. SELLAR, Esq.
G. B. DEWHURST, Esq.	ROBERT HENDERSON, Esq.	Col. LEOPOLD SEYMOUR.
ROBERT B. DOBREE, Esq.	LOUIS HUTH, Esq.	LEWIS A. WALLACE, Esq.
GEORGE L. M. GIBBS, Esq.	HENRY J. B. KENDALL, Esq.	WILLIAM B. WATSON, Esq.

Secretary.
JOHN P. LAURENCE, Esq.

Underwriter.
JOHN ANTHONY RUCKER, Esq.

Actuary.
ARTHUR H. BAILEY, Esq.

Manager of the Fire Department.
WILLIAM H. HORE, Esq.

Medical Officers.
EDWARD CLAPTON, M.D., St. Thomas's Street, Southwark.
JOHN HARLEY, M.D., 39, Brook Street, Grosvenor Square.

Solicitors.
Messrs. JOHNSONS, UPTON, BUDD & ATKEY, 20, Austin Friars.
Messrs. COLLYER-BRISTOW, WITHERS & RUSSELL, 4, Bedford Row.

West End Agents.
Messrs. GRINDLAY & Co., 55, Parliament Street, S.W.

The Corporation has granted Fire, Life, and Marine Assurances for more than a Century and a half; during that long period it has endeavoured to introduce into its practice all the real improvements that have from time to time been suggested, and to afford every facility for the transaction of business.

Of the Share Capital the sum of £448,275 has been paid up; the total Funds, on the 31st December, 1877, exceeded Three Millions sterling.

Copies of the accounts pursuant to "The Life Assurance Companies' Act, 1870," can be had on application personally or by letter.

J. P. LAURENCE, *Secretary.*

NORTH BRITISH AND MERCANTILE INSURANCE COMPANY.

ESTABLISHED IN 1809.

CAPITAL TWO MILLIONS.

Accumulated Life Funds	£2,711,876
Fire Reserve Fund	1,097,248

DIRECTORS.

Chairman, John White Cater, Esq.
Deputy-Chairman, Charles Morrison, Esq.
Richard Baring, Esq.
Richard Brandt, Esq.
A. H. Campbell, Esq.
Edward Cohen, Esq.
John Fleming, Esq., C.S.I.
P. du Pré Grenfell, Esq.
Right Hon. Lord Lawrence, G.C.B., C.S.I.
Hon. Hugh M'Culloch.
J. S. Morgan, Esq.
George Garden Nicol, Esq.
Baron John H. W. Schröder.
George Young, Esq.

MANAGER OF FIRE DEPARTMENT.
G. H. Burnett.

MANAGER OF LIFE DEPARTMENT.
Henry Cockburn.

SECRETARY.—F. W. Lance.

MEDICAL OFFICERS.
A. H. Hassall, M.D.; R. C. Cream, M.D.; Hermann Weber, M.D.

SOLICITOR.—Sir W. R. Drake.

GENERAL MANAGER.
David Smith, F.R.S.E.

LIFE DEPARTMENT.

THE PRINCIPLES on which this Company was founded, and on which it continues to act, combine the system of Mutual Assurance with the safety of a large Protecting Capital and Accumulated Funds, and thus afford all the facilities and advantages which can prudently be offered by any Life Assurance Office. Under these principles the business of the Company continues rapidly to increase.

NINETY PER CENT. of the WHOLE PROFITS is divided among the Assurers on the Participating Scale.

THE PROFITS are divided every Five Years.

POLICIES INDISPUTABLE after Five Years.

ANNUITIES of all kinds are granted, and the rates fixed on the most favourable terms.

FIRE DEPARTMENT.

PROPERTY OF EVERY DESCRIPTION, at Home and Abroad, Insured at the most favourable rates.

The net premiums for 1877 amounted to £908,014.

Prospectuses and every information can be obtained at the

CHIEF OFFICES—

LONDON: 61, Threadneedle Street, E.C.; WEST END OFFICE: 8, Waterloo Place, S.W.; EDINBURGH: 64 Princes Street.

THE

PROVIDENT LIFE OFFICE,

50, REGENT STREET, LONDON, W.

FOUNDED 1806.

HALF-CREDIT SYSTEM,

Applicable only to With-Bonus Policies for the whole Term of Life (TABLE A), *and to Lives not exceeding 60 years of age.*

UNDER this system, one-half the Premium only is payable during the first 5, 7, or 10 years, in the option of the Assured; the other half-premium remains a charge against the Policy, bearing 5 per cent. interest, payable in advance.

The arrears of half-premium may be paid off at any time, or be deducted from the sum assured when the claim arises, or from the Office value in case of surrender.

This system offers the advantage of a low premium during the early years of life, and thus enables an Assurer to open a policy for a larger amount than could be obtained under the ordinary terms.

The large Bonuses declared by this Office may reasonably be expected (except upon Policies of a very recent date) to clear off any charge which may be due for these arrears of premium.

BONUSES UPON POLICIES STILL IN EXISTENCE.

No. of Policy.	Date of Policy.	Sum Assured.	Policy Increased by Bonnses to	Percentage of Bonus to Sum Assured.
		£	£ s. d.	
3,924	1821	5,000	13,056 15 0	161 per Cent.
5,389	1824	1,000	2,364 14 0	136 ,,
6,876	1829	1,000	2,305 18 0	130 ,,
6,111	1827	200	478 16 10	139 ,,

S. A. BEAUMONT, ESQ., *Managing Director.*
CHARLES STEVENS, ESQ., *Secretary.*

British Empire Mutual Life Assurance Company,

NEW BRIDGE STREET, LONDON, E.C.

Established 1847. *Empowered by Special Act of Parliament.*

DIRECTORS.

JOHN RUNTZ, Esq., *Chairman.* AUGUSTUS BENHAM, Esq., *Deputy Chairman.*

C. STUART BARKER, Esq. | GEORGE PHILLIPS, Esq.
PETER BUNNELL, Esq. | GEORGE ROOKE, Esq.
JOHN R. BURTON, Esq. | JOHN E. TRESIDDER, Esq.
ROBERT FREEMAN, Esq. | J. H. TROUNCER, Esq., M.D., Lond.
WILLIAM GROSER, Esq. | FRED. WILLS, Esq.

Solicitors—Messrs. WATSON, SONS, & ROOM.
Physician—E. H. GREENHOW, M.D., F.R.S. *Surgeon*—JOHN MANN, Esq.
Actuary—J. MARTIN, F.I.A.

This Company being established on the **Mutual Principle**, all the profits belong to the Members.

Every third year a careful Valuation of the Assets and Liabilities is made, and at each Valuation large Bonuses have been declared. The next division of profits, viz., the tenth, will be declared in 1879.

It has Policies now in force, assuring a sum exceeding **Three Millions and a Quarter Sterling.**

It has an Annual Income of more than **One Hundred and Thirty-two Thousand Pounds.**

It has an Accumulated Fund, arising solely from premiums, exceeding **Six Hundred and Eighty-two Thousand Pounds.**

It has paid in claims upwards of **Seven Hundred and Ninety-five Thousand Pounds.**

Loans on Churches, Chapels, School Buildings, &c., advanced at 4½ per cent. Interest.

Loans on personal security in connection with Life Assurance.

Prospectuses and Copies of the last Report and Balance Sheet, and all needful information, can be obtained on application to any of the Agents of the Company, or to EDWIN BOWLEY, *Secretary.*

THE

GENERAL REVERSIONARY & INVESTMENT COMPANY.

Office—No. 5, WHITEHALL, LONDON, S.W.

ESTABLISHED 1836.

Further Empowered by Special Act of Parliament, 14 and 15 Vict., cap. 130.

CAPITAL, £500,000.

DIRECTORS.

Chairman—JOHN CHAVE LUXMOORE, Esq.
Deputy-Chairman—Colonel JOSEPH WALKER JASPER OUSELEY.

MAYOW WYNELL ADAMS, Esq. | EDWARD CARLETON TUFNELL, Esq.
THOMAS ALLEN, Esq. | EDWARD WALMISLEY, Esq.
WILLIAM ROBERT BARKER, Esq.

Auditors—Sir CHARLES RHODERICK MCGRIGOR, Bart., MARTIN JOHN KING BECHER, Esq., JOHN COOKES, Esq.
Bankers—Messrs. DRUMMOND.
Solicitors—Messrs. SHOUBRIDGE & MAY, 19, Lincoln's Inn Fields, W.C.

The business of this Company consists in the PURCHASE of, or LOANS upon—

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The last Annual Report can be obtained upon application.

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CAPITAL £2,000,000.

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TWENTIETH ANNUAL REPORT.

The Report and Accounts for the year 1877, presented to the Shareholders at the Annual Meeting, on Thursday, 23rd May, 1878, at which Bernard Hall, Esq., presided, showed:—In the Fire Branch, that the premiums for 1877, after deducting Re-insurances, amounted to **£450,883**, being an increase of **£47,068** over the premium income of 1876, and the losses to **£383,567** (including **£127,000** lost in the St. John Fire), and that after providing for all liabilities the reserves stand at **£243,441**. In the Life Department, that new policies had been issued for **£192,905**, and that the Life Fund, by the additions made to it as the result of the year's operations, now represents 66·5 per cent. of the entire net premiums received on every policy in force.

A Dividend and Bonus at the rate together of 15 per cent. per annum was declared, after providing for which,

THE FUNDS will stand as follows:—

Capital Paid-up	£180,035
Reserve Fund and Suspense Account	243,441
Life Assurance Accumulation Fund	276,206
Annuity Fund	8,587
The Income of the Company is now	£545,433
The Company has paid in satisfaction of Claims	£2,469,622

J. MONCRIEFF WILSON, *General Manager.*
T. WALTON THOMSON, *Sub-Manager.*
J. K. RUMFORD, *Secretary in London.*

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ESTABLISHED A.D. 1806.

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	£	s.	d.
Viz., on the 20th August, 1875	3,167,289	2	9
Sum Assured—Inclusive of Bonus Additions—at that date . . .	4,893,272	6	4
Estimated Liability thereon (Northampton Table of Mortality, 3 per Cent. Interest).	1,451,708	14	6
Being less than one-half the Fund invested.			
Total Amount of Bonus Additions made to Policies	3,251,871	3	9
Amount of Profits divided for the Seven Years ending 20th August, 1875	535,216	16	0
Annual Income	286,533	19	7
Total Claims paid—Inclusive of Bonus Additions	7,893,697	1	8

*** Copies of the Accounts deposited with the Board of Trade, pursuant to "The Life Assurance Companies' Act, 1870," as well as of the Periodical Valuation Accounts, and every information may be obtained on application. H. W. PORTER, *Actuary.*

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